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THE FOUNDRY

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Trade Outlook.

The increased steadiness with which general trade conditions proceed is being felt by the foundry trade also in a greater demand for castings and a less desire on the part of foundrymen to shade prices to obtain orders.

While the stove manufacturers have not been entirely satisfied with the business done by them in 1900, it is to be hoped that the current year will more than make up for any disappointment of the past. High prices will ultimately check demand in stoves as well as in steel rails. Last year the stove manufacturer had to pay abnormally high prices for nearly every kind of material entering his product, and when he advanced prices accordingly there was a falling off in the volume of trade which has not yet been regained. Nevertheless the leading association of stove manufacturers decided not to reduce the wages of molders for the current year, an action upon its part which is to say the least commendable. Nothing tends more to paralyze the status of an industry than to let reduction after reduction take place within it.

The large melters of iron for such work as car and car wheels, water and gas pipe, are helping along consumption at more than a normal rate. The malleable trade is picking up and the demand for charcoal irons is very active.

The statistics at hand concerning pig iron production indicate that there was but a slight increase during March, while stocks of iron at furnaces were decreased 67,000 tons. Rogers, Brown & Co. in a recent report say: "Whether the melt is actually in excess of the make, as these figures indicate, cannot be told positively, for in advancing markets buyers stock up, while in declining markets, they hold back purchases. Certain it is, however, that the demands of the country unless checked by unforeseen disaster, will tax our productive capacity to the utmost. The many new projects that are taking shape in bankers' and brokers' offices in New York, Chicago and other centers, if consummated, will call largely for constructive work, in some form, and that runs into iron and steel. The great movement for re-equipment of the railroads of the country is far from completement. With some lines, it is only beginning. There is nothing to indicate that the people who a year and a quarter ago stopped buying implements, wires, stoves, etc., because of abnormally high prices, will do so again this year, or next, if prices remain normal.

"On this point, the action of the lake ore companies in fixing the price of standard Bessemer ore at $4.25, is of interest. This is lower than any figure that had been predicted in recent weeks, and seems to show that the policy of the powers, that now control the raw materials for steel making, will be to encourage consumption by keeping prices moderate. From this time on, the hand of the new giant in the trade may be expected to be felt.

The continuance of depression and pessimism in the British iron trade begins to excite attention. It is not believed that industrial conditions throughout the world, nor even in England, warrant it. It is interpreted, on this side, as a state of mind brought on by a com-

bination of circumstances calculated to hurt British pride and prejudice. It is not believed that foundation facts warrant it. Pig iron today is lower at Middlesboro than at Birmingham, Ala., a thing unprecedented. It is certain that if British mills and furnaces can continue to produce at present prices, they are entitled to most of the trade of the outside world, including Mexico, South America and our own Pacific coast. Germany is maintaining her rate of production, while England has dropped twenty-five per cent. An occasional note of cheer is again heard from the Continental markets. It may be found that the world's progress will go on for some time yet."

Matthew Addy & Co. refer to the development of the iron trade as follows: "The great decrease in furnace stocks in the month of March is a fact of foremost importance in the situation. April will probably show a further decrease, for shipments are being made at a phenomenal rate. As we have pointed out, stocks are not being accumulated by consumers, but iron is being turned into finished products as fast as it is received. There is a constant demand for faster shipments on old contracts. In fact, in some lines of trade business is so active that it is almost impossible to quite meet the views of customers in regard to shipments. At the present time, there is a steady demand with no transactions of great magnitude, yet the aggregate tonnage is wholly satisfactory, the buying being mainly for shipment after July. It need hardly be stated that prices are firm and buyers have so fully recognized the state of affairs that there has been no serious attempt to shade quotations. All grades of iron have been in demand and no one particular grade has been a leader. At the present time several important inquiries are on the market and it is probable before our next report that these inquiries will be turned into actual orders."

Consolidations in the Foundry Trade.

As before noted in these columns, the foundry trade has not altogether escaped the tendency of the times to amalgamate interests engaged in a similar line of business. Furthermore, it must be acknowledged that a "community of interests" can be made as beneficial to the foundry trade as to any other industry.

The gas and water pipe manufacturers were among the first to pool their interests, agreeing upon a division of territory and regulating the conditions under which their output should be marketed. Considerable hostile legislation was in progress when one company purchased the leading plants outright and put an end to the enactment of measures which had for their object more the furtherance of political aspirations than the accomplishment of any good to the consumer.

The soil pipe manufacturers were not slow in realizing that considerable economy could be effected, not only in manufacturing but also in distributing their product, by having a central organization to look after their affairs. While several plants were purchased which could not in the least be considered as factors in the trade, an assertion which is proven by their later dismantlement, still the complete control possessed by this interest in its field today justifies any expenditures which may have been made upon its inception.

Among other interests, in whose finished output the foundry plays an important part, may be mentioned the school furniture manufacturers, the car builders, the steam pump manufacturers, and the makers of radiators. While no one of these is totally controlled by one company, still there is a dominating factor in each with whom competitors must reckon.

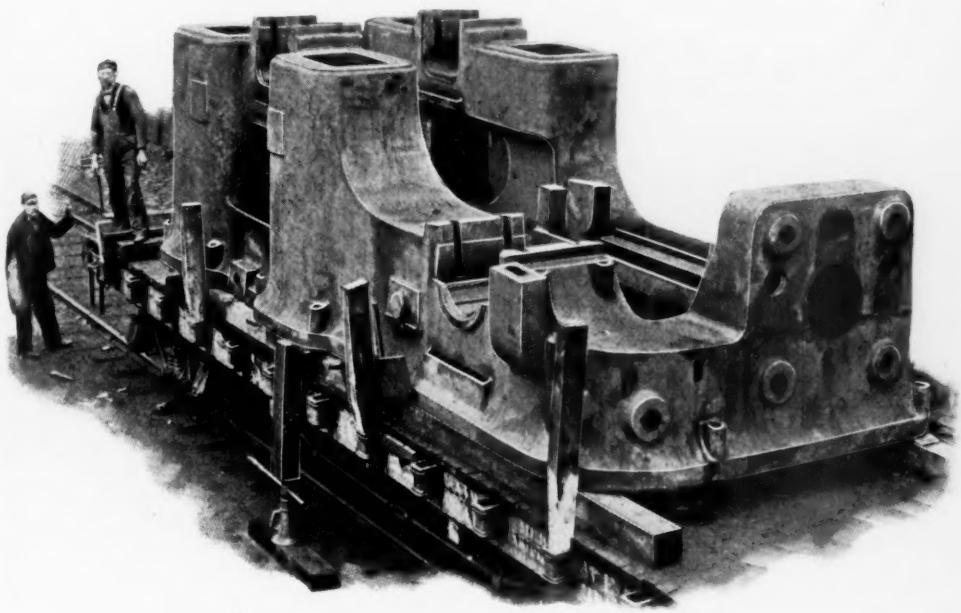
One of the branches of the trade which should receive great benefit from a closer alliance is the car wheel industry. The building of larger cars and the increased rigidness of the specifications under which wheels will be accepted for service should cause their makers to lend their ready assistance to any project having for its object their mutual advancement.

It will be noted that all of the industries which have shown a willingness to pool their interests embrace only special lines of manufacture. The general jobbing founder is yet ready to knife his competitors, as far as prices are concerned, and it is nothing to be proud of that too often one member will attempt to beat his neighbor through lowering the wages of his workmen, instead of trying to accomplish the same purpose through increased facilities. It would seem as if the interests of the smaller manufacturers are much more difficult to protect than where a large capital is at stake.

A few weeks ago there was a meeting of the Sash Weight Makers at Indianapolis. What agreement was reached as to prices is not known. As a general proposition it may be

stated that a supply of cheap iron is necessary to carry on this business successfully.

Rumors have also connected the American Car & Foundry Co. with a plan to secure control of at least the freight car department of the Pullman Co. At the same time the three large steel casting manufacturers in the vicinity of St. Louis, viz.: the Scullin-Gallagher Iron & Steel Co., the American Steel Foundry Co., and the Shickle, Harrison & Howard Iron Co. are reported as seeking a closer alliance. Their interests are also closely allied with the American Car & Foundry Co.



BED PLATE FOR A PUMPING ENGINE.

One of a series of heavy castings being turned out by the Farrel Foundry & Machine Co., Ansonia, Conn.

From Philadelphia comes the report that it is intended to consolidate the big engine plants of the country, with a capital of $50,000,000, including works in Philadelphia, New York, Milwaukee, Wilkesbarre, Youngstown, Akron, Hamilton and Canton, Ohio. Some of the companies that have been named in connection with the talked-of trust are the Southwark Foundry & Machine Co. of Philadelphia; Robert Wetherill & Co. of Chester; Watts-Campbell Co., and Hughes & Phillips of Newark, N. J.; the Corliss Engine Company of Providence, the Lake Erie Engineering Co. of Buffalo, and the E. P. Allis Co. of Milwaukee.

The proposed combine would necessarily include many others, but the above concerns are regarded as likely to consider favorably one controlling company because of the similarity of their interests. They all build the Corliss type of engines largely, and a consolidation would mean big annual savings in operating expenses. It is believed that the builders of small stationary engines are not likely to combine, as the types of engines built are by far too many to admit of an amalgamation of interests. At least two partial attempts have been made to combine the big engine works, but both failed. Indeed, in neither case did the attempt get much beyond the proposition stage.

The beginning of the year appears to be prolific in new combines closely touching the foundry trade. The big manufacturers of mining machinery are said to be laying plans by which they may at least bring about a working agreement.

Elsewhere in this issue we have given particulars concerning the proposed combination of ingot mold manufacturers. Altogether the foundry interest is furnishing its share of consolidations.

Are We Short of Competent Foundry Managers?

Good men are always scarce. The very best of any article commands a fancy price whether it be oranges or foundrymen. The price paid in both cases, however, fluctuates with the supply.

We present in this issue two papers bearing upon the subject of educating practical foundry managers. Mr. Randall shows what is being done at the University of Illinois, and considering the foundry as a school shop, and the fact that students are given but nine weeks instruction, the work turned out may be said to be very creditable.

Every practical foundryman knows that nine weeks training even under the best of circumstances will really only permit the student to receive an insight into the principles which underlie practical founding. Every one of us who has ever had the pleasure of digging in the sand with a short shovel knows that we for the most part only learned from failures, either made by ourselves or others.

How many of us did not after working a couple of years at the business imagine that we knew, at least, ninety per cent of all that was to be learned about the foundry business? And as we grow older, after having fallen down on first one job and then another, how many of us are there who will not acknowledge that we have much to learn and that we will likely never graduate as masters of the molders' trade.

Mr. West finds fault with the general trend of the better educated class of people to leave the founders' trade alone. Are they to blame? We will try to show that they are not.

The best men in any trade start at the bottom. They learn from the ground up. So does the successful foundry manager. The one who began half way up the ladder can not give much practical advice when anything goes wrong.

The bottom of the foundry business is not inviting. The trade may be called noble and grand by an outsider, but ask him to take off his coat and carry a dozen bull-ladles of hot iron or invite him to put up a good day's work on the floor and the nobleness of the calling quickly disappears.

Mr. West's assertion that too many prefer to kill themselves with brain work rather than to work at something which might dirty their clothes and hands in a trade whereby they could get along with half the labor and at the same time double their income, exposes the author's unfamiliarity with the chances which are offered young people in the commercial world. But a few feet from here sits a stenographer who, with only a couple of years' experience, is earning as much money as is paid the union molders of this city, and Cleveland does not pay the lowest wages either. Shall he be asked to throw up his eight hours a day in a clean, well-ventilated office for four years of an apprentice's life in the back-breaking trade of molding?

Three dollars a day is considered good pay for molders. The majority receive less. We should certainly advise young men to have an ambition which reaches beyond this narrow limit of the foundry.

But let us leave the common herd of molders and consider the foundry manager. There are in the neighborhood of forty-five hundred iron and steel foundries in the United States. In over three thousand of these the manager of the foundry receives less than a hundred dollars per month. There are probably twelve hundred foundries who pay their foremen a salary of from twelve to eighteen hundred dollars per annum, leaving but three hundred shops which exceed this figure. The shops which pay a salary in excess of twenty-five hundred dollars per annum to their foundry managers can almost be counted on the fingers of one's hands.

We have no doubt but that Mr. West receives many applications for competent superintendents and foremen, but it should not be forgotten that many of these proprietors seek to obtain a first-class foreman at a rate of fifty-cents per day above the wages paid an ordinary molder. The young man with any ambition would indeed be foolish to sacrifice it at such a price.

Mr. Randall is more familiar than Mr. West with the true reason why technical men do not take to the foundry. He sums up the situation as it is when he says: "During past years, as well as present, there has been a greater demand for technical men than could be supplied; but of these requests few ever came from the foundries. Prospects of employment have not been good enough to warrant engineering students to specialize in foundry work. If the foundries need technical men and are willing to offer the same inducements that other engineering enterprises do, a fair proportion of engineering students will give attention to that branch of work."

The foundry proper offers less opportunities for advancement to well paid positions than

the majority of trades. In short, the money is not there. Strange it is too that the largest salaries paid to foundry managers are not given to men with an all around training, such as is suggested in Mr. West's paper, but to those in charge of specialty shops.

ers' tub. The core oven is of brick, built into the cupola room with double doors opening into the molding room. It is 6 x 8 x 7 feet, and is provided with movable shelves for cores and dry-sand molds. A line shaft runs through the foundry and furnishes power to

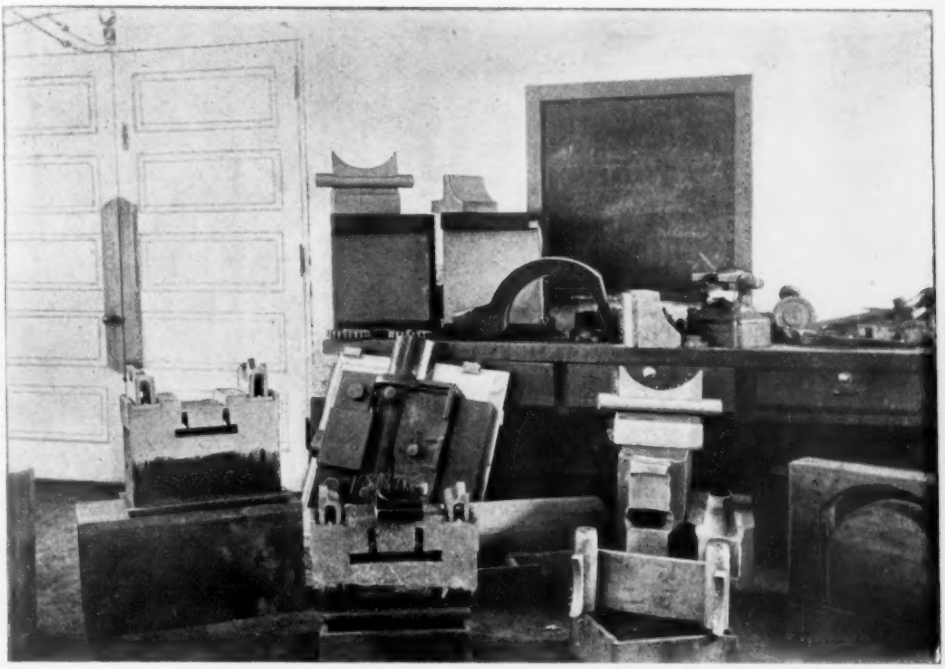


FIG. 1.—CORES FOR HIGH PRESSURE CYLINDER 65 H. P. TANDEM COMPOUND ENGINE.

Instruction in Foundry Practice at the University of Illinois.*

BY D. T. RANDALL, Urbana, Ill.

The Mechanical Engineering Department of the University of Illinois contains a well-equipped machine shop, a forge shop, and the foundry. The foundry has a molding room 48x48 feet, with a 20x30 foot cupola room added on one side as a wing to the building. The walls are of brick, the windows are large and are placed about six feet from the floor. Light is also admitted from above through the clerestory windows, which are hinged and may be easily adjusted from the floor, an arrangement which provides for perfect ventilation. The cupola is a Whiting No. 1, lined to 22 inches inside diameter, and the blast is furnished by a No. 7 Buffalo blower. A brass furnace is installed at one side of the molding room, and near by is the brass mold-

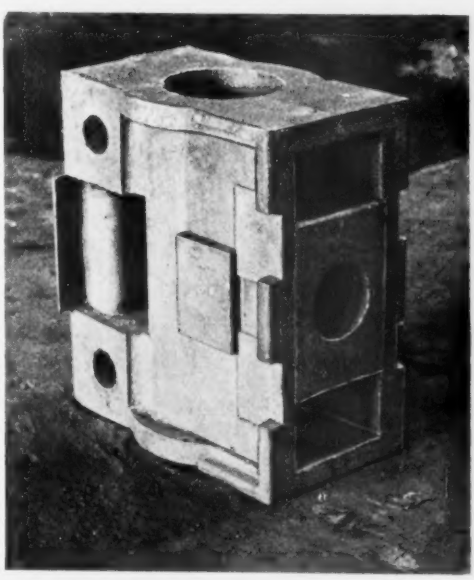


FIG. 2.—HIGH PRESSURE CYLINDER.

*From a paper read before the Foundrymen's Association.

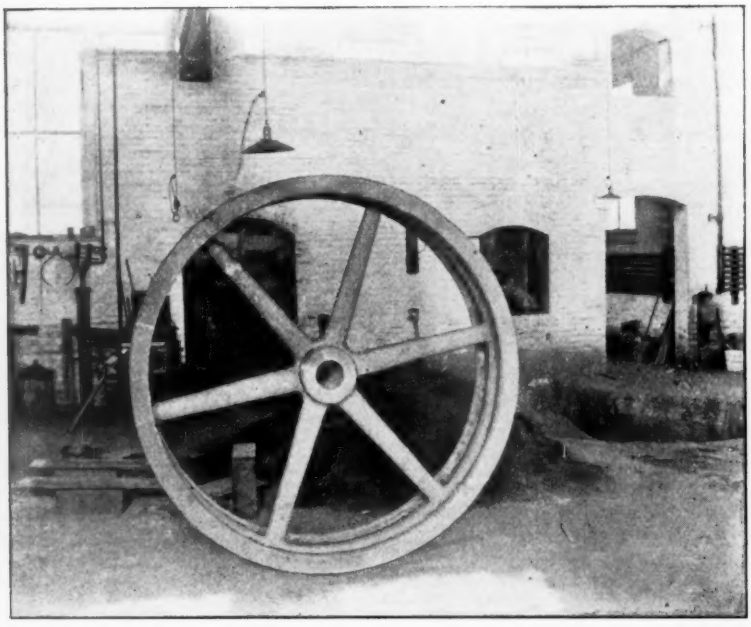


FIG. 3.—72-INCH FLY WHEEL FOR COMPOUND ENGINE.

the blower, a grinding stand and a rattler. A Pridmore molding machine fitted with gear patterns furnishes a means of comparing hand molding with machine work. There is on hand a full supply of crucibles, ladles, tongs, flasks, brushes, and small tools. On the side opposite the cupola a molding bench extends along the wall. The larger work is bedded in the floor near the cupola.

It is the policy of the Mechanical Department to have some machine under process of construction each year, which will give the students good shop instruction and which when finished will add to the useful machines in the shop or laboratory.

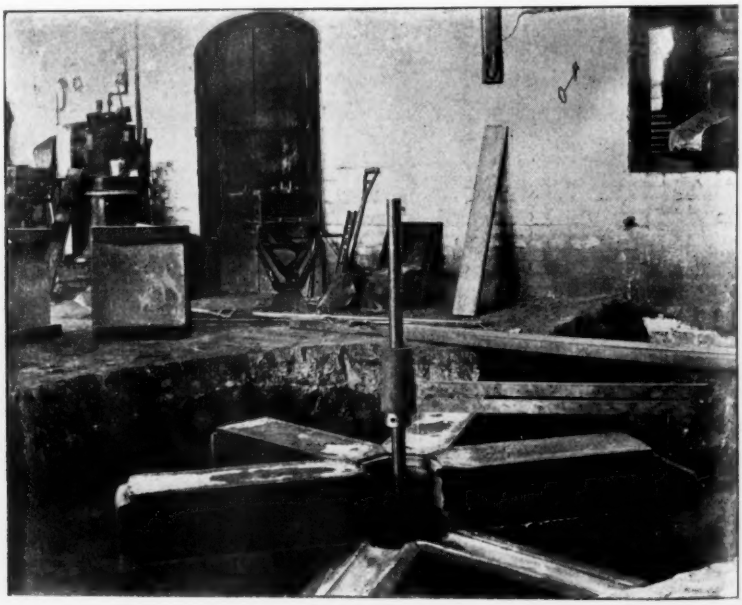


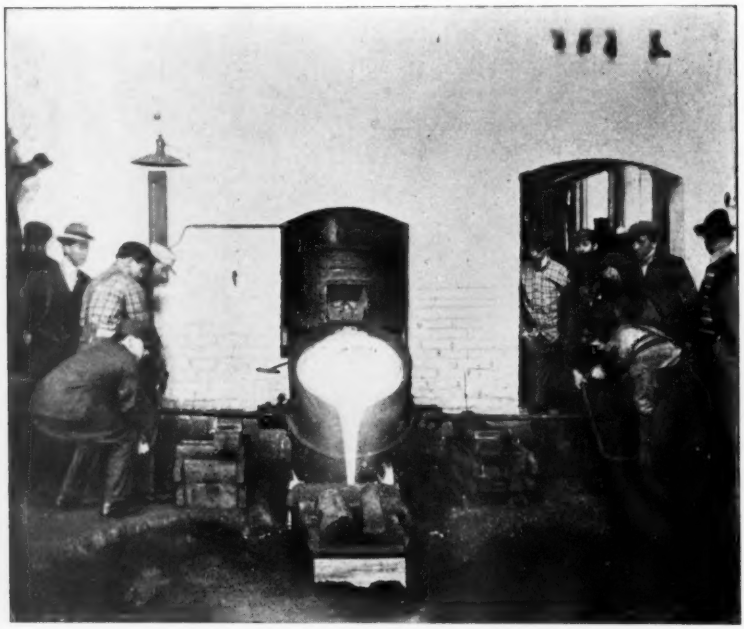
FIG. 4.—MOLD FOR FLY WHEEL.

FIG. 5.—MOLD FOR FLY WHEEL.

At present a tandem compound steam engine, having a nominal rating of sixty-five horse power, is furnishing shop practice for the several departments. Fig. 1 shows a collection of cores prepared for this engine, and Figs. 2 and 3 show the high pressure cylinder and the fly wheel as they came from the molds. Figs. 4, 5 and 6 show methods used in molding the fly wheel in green and dry sand. This wheel is 72 inches diameter, weighs about 2,800 lbs., and is being finished in the machine shop.

The College of Engineering provides instruction in the following branches: Archi-

FIG. 6.—MOLD FOR FLY WHEEL.



TOURING FLY WHEEL.

tecture, Architectural Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering, Municipal and Sanitary Engineering, Railway Engineering.

Students in all of the above courses, except the first two, are required to do shop work during their first year to the amount of nine hours per week. Instruction in wood work covers a period of eighteen weeks; in forge work, nine weeks; in foundry practice, nine weeks. Only students in Electrical and Mechanical Engineering courses are required to do shop work in the second year. These students work in the machine shop seven and

CLASS IN FOUNDRY PRACTICE.

MECHANICAL ENGINEERING DEPARTMENT SHOPS
UNIVERSITY OF ILLINOIS

FOUNDRY RECORD

Heat No. _____ Date _____

Make of Cupola _____ Size of Cupola _____

Make of Blower _____ Size of Blower _____

Fire started _____ Blast put on _____ Bottom dropped _____

First iron charged _____ First fluid iron appeared _____ Blast in inches _____

Pig iron used { Kind _____ No. _____
Analysis _____

Scrap iron used { Kind _____ No. _____
Analysis _____

Coke used { Kind _____
Analysis _____

Flux used—Kind _____ Quantity _____

	Coke.	Pig Iron.	Scrap Iron.	Weighed by	Remarks
1st charge					
2d charge					
3d charge					
4th charge					
Totals					

Total weight of iron melted _____ Ratio of iron melted to coke used _____

Weight of good castings _____ Weight of poor castings _____

Weight of sprues, gates, &c _____ Weight of iron lost in melting _____

Per cent. of iron lost in melting _____

General description of castings made—size, shape, weight, &c. _____

Test bar, { Analysis _____
Transverse test—size _____ c. to c. _____ Result _____
Tensile test—size _____ Pounds per square inch _____
Hardness. By cutting or drilling _____
Microscopic features _____

Remarks—

REDUCED FAC-SIMILE OF A RECORD SHEET FROM THE FOUNDRY AT THE UNIVERSITY OF ILLINOIS.

one-half hours per week during the entire school year.

An estimate of the total number of hours each student receives shop instruction will show that but little time is really given to it, and that but little more than the principles and theory can be taught. Owing to this their work in the foundry is of necessity largely exercise work designed to illustrate the principles of molding, involving the use of patterns, sweeps and cores in making green and dry sand molds. Each student is also taught to care for the cupola, to make it ready, to charge it, and to tap and pour the iron. A considerable amount of repair work from other departments of the University comes to the foundry, very much as does work to a small jobbing foundry. Students do as much of this work as possible. At times more work comes than can be handled by the foreman and the inexperienced students. In such a case a molder is hired for a time to assist the foreman. The foreman is a man who has had a number of years' experience in commercial foundries.

After the students have gone through a course of shop instruction, it is not expected that they will be pattern makers, molders or machinists. However, they are encouraged to become as proficient as possible, and many students have done very good work in commercial shops after two years' instruction in shop practice. The main object of the College is to train engineers. It has been found best to put shop instruction on the same basis as mathematics, literature, chemistry and other subjects that are helpful to engineers. A considerable number of students obtain employment in shops during vacations and thus earn money for the following year at college, and at the same time round out the knowledge gained in the school.

Besides the students taking the regular course, the University provides for men over twenty-one years of age, who have the ability to take the work they desire, by admitting them for special work in any branch of engineering. For example, if a young man desired to perfect himself in foundry management, he might make arrangements to do work in chemistry and foundry practice only.

At first thought it may seem that a school foundry ought to do a great deal of experimental work. But when one considers that the duty of the foreman is to teach classes of young men who come to him with no knowledge of the foundry and are to receive instruction during a period of nine weeks only, it is clear that all his energies must be given to instructional work. Students in the senior class are encouraged to take up problems in the foundry for thesis work. Recently, for the first time, two students have expressed a desire to do experimental work and make a special study of foundry practice next year. During past years, as well as present, there has been a greater demand for technical men than could be supplied; but of these requests few ever came from the foundries. Prospects of employment have not been good enough to warrant engineering students to specialize in foundry work. If the foundries need technical men and are willing to offer the same inducements that other engineering enterprises do, a fair proportion of engineering students will give attention to that branch of work.

Just at present the University has no testing laboratory, owing to loss by fire last June, but it is confidently expected that a new laboratory will be provided before work begins next fall. A Foundry Record sheet has been prepared for use in the foundry and partial records are being made. It is hoped to make the records complete as soon as the new laboratory is completed.

The Mechanical Engineering Department will be glad to aid in advancing the foundry interests, and will look upon any suggestions to that end from foundrymen as additional encouragement to do so.

Need of Closer Union of Financial and Practical Shop Management.

There has been much written upon the subject of shop management. From this fact it is evident that there is room for improvements, and a desire for greater competency to meet the demands of progress in manufacture. As my views have been solicited on this subject on several different occasions and there is at present a strong likelihood of steps being taken to advance the work of manual training, I take this means of presenting what my experience would suggest as best for manufacturing industries.

This has been called a practical age. In one way, and a very deplorable one, it is the most impractical age this country has ever known. There has been too much seeking for those positions that would permit of keeping the clothes and hands clean. Parents have sought for and taught their children to seek office work instead of shop positions, and to such an extent that young people for the past 30 years have been surrounded with an atmosphere of disrespect and hatred for manual labor.

Altogether too many prefer to kill themselves by brain effort and wit work in making a livelihood, than to be seen with shop clothes and unclean hands, although by the latter they need not worry or labor half as much and their income might be doubled. This sentiment is responsible for the fact that today from one-half to three-fourths the proprietors of manufacturing establishments are impractical men who are dependent upon men not having a cent invested in their plants, to manage the practical end of their business. This state of affairs is responsible for higher costs in manufacture and also much of our labor difficulties, and will lead our country to great disaster if a turn is not soon made to change present conditions.

A manager, superintendent or foreman who has money invested in his work sees things differently from the man who has no capital at stake; and when the former is wholly dependent upon the latter for managing the practical end of his business, it allows those not thoroughly conscientious to permit or create practices far from beneficial to labor and capital or calculated to maintain one country's supremacy in the manufacturing world.

Some might say, Why does not the proprietor take the practical man into partnership oftener than is done if this is so desirable and beneficial to all concerned? This is rather a complex question to solve, and one that should be honestly and fearlessly met and discussed. One great reason why practical men do not give their best energies to furthering the interest of manufacturing proprietors is due to the inability of many of the latter to appreciate the services of a strictly honest and able superintendent or foreman. Then again, there are too few who appreciate the ability

required to finance a business or put themselves in the way of understanding the technical or scientific work of their calling in connection with their practical training. The latter is too often merely that of an imitator, lacking all originality and ability to overcome obstacles that they had not seen others master.

An eminent New York financier has very recently said that Andrew Carnegie's great success in life was due to fortunate opportunities. It is very evident that this financier is one of that class who are unable to appreciate true worth in the able, practical shop manager, superintendent or foreman. Then again such a statement does great injustice to Mr. Carnegie, for the reason that all having control of successful iron works of any magnitude know that nothing but the best generalship and not good luck is responsible for their success. The management of iron works is such a proposition that poor success or bankruptcy is the result if the head is not a true general in either having the ability to direct shop affairs himself, or in obtaining and controlling those that are.

Those that have been under the direction of Mr. Carnegie or have participated in management with him will not, I am sure, endorse the above financier's statement, but will rather agree with me in saying that Mr. Carnegie has set an example to the world by showing appreciation of ability in the practical man—such ability as our country now stands sadly in need of, and that can be developed by trade schools conducted on progressive lines.

In presenting ideas and suggestions for advancing the practical man so as to make him a better coadjutor for the office, or financial manager of manufacturing industries, I shall refer more directly to the founder's interest and leave other trades to those experienced in their practical lines. I believe my experiences in broad founding and research to advance its interest and standing in the mechanical world should entitle me to recognition in suggesting improvements in detail for my own trade. These would not be now presented were it not for the fact that Mr. Carnegie has set aside a large sum of money for the endowment of a manual training institution at Pittsburg. The money for this work, I believe, is entrusted to the care of representative men of that city, and whom I trust this article will reach.

My suggestion in brief of what is now required to fit young men for the position of manager, superintendent or foreman of a foundry, is an institution that can be fitted up to make castings that will best illustrate the principles underlying the manufacture of light, medium and heavy work, in green sand, dry sand and loam. And this, by actual practice extended over a period of four years' apprenticeship (of eight hours per day) after a young man has graduated from high school. The institution fitted to give such experience in the day time should also have a night school, where the apprentices could find competent teachers to instruct them in chemistry, mechanical drawing, bookkeeping and business methods.

This is the plan in brief. I know there are those that will not approve of the suggestion that young men should work eight hours per day at manual labor and then attend night school for five nights in the week. Is this any harder labor than that imposed upon the college student of today? I would say it was easier, owing to the fact of its being a radical change in the character of the labor performed. Still further, is it harder labor than that performed by Andrew Carnegie and other self-made men in their first struggles to get a start in life? Read the biography of all self-made men and you will find that they did not get their start in life by hanging on street corners or after their day's work, spending their nights seeking rounds of pleasure. And further, it will be found that the men who are chiefly responsible for the world's advancement in art, science, literature and invention, never reckoned that their labors should cease with daylight. Life is too short for man to throw away valuable time in his earlier years, which should be so spent that he may be profitable to himself and the world to which he owes an effort to leave it better than he found it.

Our present system of education misdirects the energies of altogether too many men. Some study hard up to 25 and 30 years of age and then wonder why they cannot succeed in life. Not until too late do they find that it would have been better for them had they combined theory and practice to a greater extent. We cannot all be doctors or professional men and the sooner the young men of today come to discover that the professional fields for labor or those in which they can keep clean hands and clothes, are greatly overcrowded, and again that there is a demand for the skilled and studious mechanic, capable of managing manufacture to obtain the greatest efficiency from a plant, the less will we have of scheming to live by one's wits, and less of criminality and charity.

We often hear of the claim that the young men of the working class of the present day have no opportunity. This is not true. The young man who can shut his eyes and turn a deaf ear to the allurements of pleasure seeking, and settle down to shop labor during the day and a study of principles and technical work directly connected with his trade at night, for three or four years will find there are opportunities for him. Could such an institution as herein outlined be opened for the training of shop managers, superintendents and foremen, it would help to put down the popular cry of no opportunities for poor young men. I believe such a trade school could be run to be self-sustaining and at the same time pay apprentices as good wages as they obtain in ordinary shop practice. In fact, I believe that such an institution could in time pay good dividends upon its investment, if managed by a thoroughly practical craftsman and competent teachers, who had sufficient originality to devise the methods necessary to be instituted in such trade schools.

In entering apprentices, I would suggest that they be given one to two months' trial, and if found lacking in mechanical ability then dismiss them to seek other occupations, which may be more in line with their talents. I believe that such a school would in a few years cause wealthy men's sons to deplore their lack of opportunity as the atmosphere in which they live is one that does not encourage them to accept dirty clothes and hands in order to compete for practical positions. However, such a school would tend greatly to an even division of opportunities and honors between all classes of society and so far contribute to a new education of industrial managers as to give assurance of our continued supremacy in manufacture. I know from letters that I have received, asking for competent superintendents and foremen, from founders all over this country, that I would have no difficulty in placing today a large number of such men as the trade school for founding I have in mind should produce.

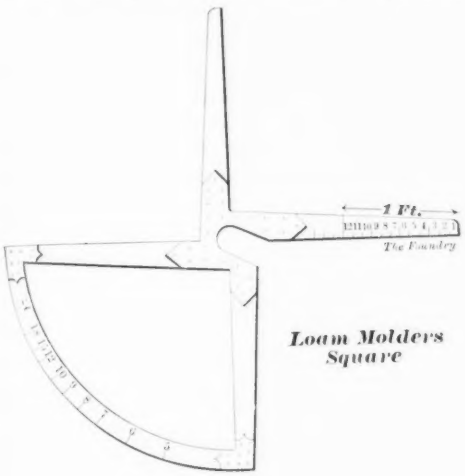
It may be asked where such an institution as herein outlined could obtain the large variety of castings best suited to give experience in green sand, dry sand and loam molding, the mixing of metals, and cupola and air furnace practice. There are several ways this could be done. As one way we now have a concern in this country that could supply every variety of castings necessary for such a school, and which, to keep 100 or more apprentices going would not make much of a deficiency in the work that would be taken from their own or others' foundries. I refer to the United States Steel Corporation. If this concern would help in such a work it would demonstrate one way in which a large combine can benefit labor and the country. A trade school with the right kind of teacher should make the castings as cheaply and as perfectly as any outside firm, and at the same time, as stated above, leave a profit to the institution.

There is still another point that it is well to touch upon, and that is that an apprentice to such an institution should learn more in four years than is now possible in five in the majority of the best shops making castings for the commercial world. In fact, such an institution could teach apprentices more in one year than the majority of the ordinary specialty shops, for the reason that they generally keep an apprentice on one class of work too long and do not have any great variety of castings on which they could change an apprentice to give him varied experience. With a trade school, as herein suggested, the work could be planned in a systematic manner so that all who had been tested and found to possess mechanical ability would have a hand in a large range of processes in making castings, or a course systematized as is done in schools or colleges before they could be granted a certificate of complete apprenticeship. Whatever disposition may be made of Mr. Carnegie's great gift for the founding of a technical institute or trade school, it is hoped that it will be so planned as to avoid the evils of the present incomplete training in the making of managers, superintendents or foremen. Instead let us hope that it will give our country something that will produce the master mechanic and manager, whose graduation the manufacturing world awaits, to place him in positions of trust and worthy of high salaries, for the valuable assistance such men can render the manufacturer whose chief contribution to business is his capital.—[Thos. D. West, in *Iron Trade Review*.

A Cylinder Cover.

The cylinder cover shown in the first illustration is made in loam, the principle dimensions being five feet over the flanges and two feet deep, and the weight of casting 5,000 pounds.

This casting is made without a pattern,



Loam Molders Square

being swept up with strickle. Loose brackets and ribs are set in the mold with the aid of the square shown, which is found to be very handy and quick for work of this kind, the quandrant having all the divisions which are in general use in the foundry marked on.

Figs. 2 and 3 are sectional views of the mold which is gated on the bottom face with four

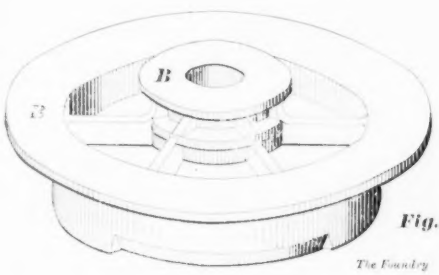


Fig. 1

round gates. These gates are brought to the outside of the brick work and upright runners fixed thereto when the mold is being rammed up.

In commencing on this job the first sweep, Fig 4, is set to the spindle, room being allowed for a course of brick and one inch of loam. Ashes, free from dust, are rammed into the spaces between the bricks. The gates are set and the mold is bricked up, finished

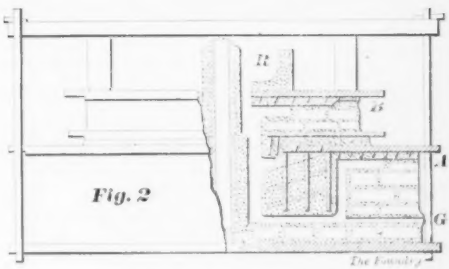


Fig. 2

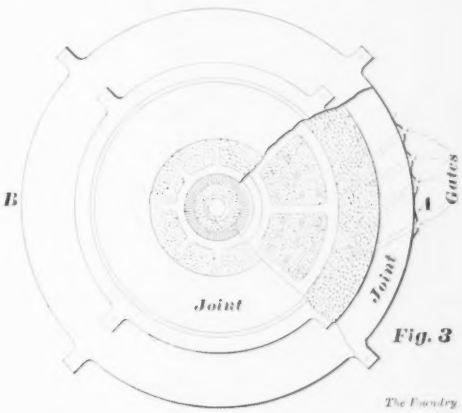


Fig. 3

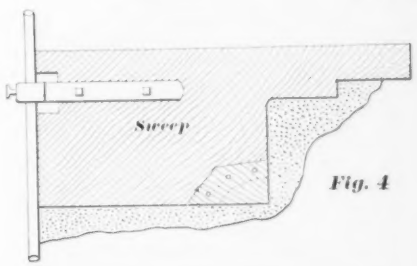


Fig. 4

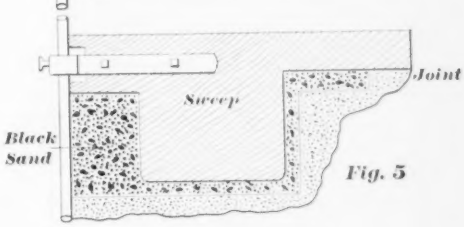


Fig. 5

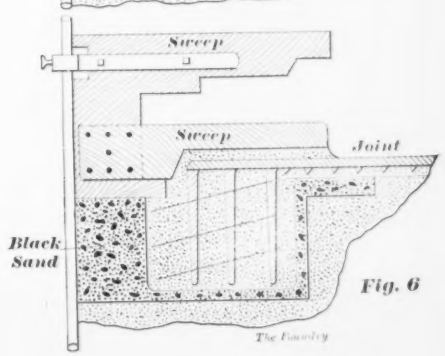


Fig. 6

off and a fire placed therein. When it is hard enough the sweep shown in Fig. 5 is set, and a thickness formed with black sand, and finished off with a little loam. The square is brought into use and eight divisions marked off and ribs set to them. A suitable plate is made with prods cast on and bedded onto the joint, the sweep, Fig. 6, is next set and the joint formed with the finger sweep, which is then removed

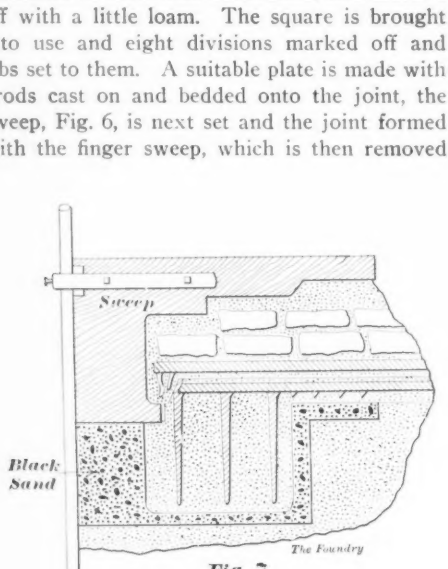


Fig. 7

and the joint left to harden or fired for an hour. The second plate is now bedded on and the mold bricked to the sweep, as shown in Fig. 7, when it is dried over night. In the morning the mold is parted, dressed and blackened, the two flanges marked B on the first illustration are scraped out about a quarter of an inch to allow for dirt in the top flanges of the casting.

When the mold is found to be thoroughly dry it is closed and cast on the same day. In practice it is found to be advantageous to pour, whenever possible, before the mold gets cold.

GEO. BUCHANAN.

The Sampling of Pig Iron.

In the February and April numbers of *The Foundry* are articles by W. G. Scott and Herbert E. Field, respectively, which give examples of what may be considered good methods of sampling pig iron. I wish to offer some suggestions concerning the position of the drill holes on the face of the broken pig. Mr. Scott drills holes two-thirds of the distance from center to outside (Fig. 1); Mr. Field a hole or holes (?) half way from center to outside (Fig. 2). Mr. Scott has about half the pig outside the center line of his drill holes; Mr. Field three-fourths of the pig outside the center line of his drill holes. It seems possible that analyses of the same lot from samples chosen by the two gentlemen might not agree.

Let us consider the manner in which a pig solidifies when cast. An outside crust forms at once, and upon this the molten interior deposits successive layers as the freezing proceeds inward. Pig iron is a complex mixture. It is characteristic of such mixtures that certain of the constituents will remain in solution much more persistently than others. Consequently proceeding from the surface to the center of the pig, percentages of such constituents would be found to increase more or less regularly. For some other reason there is also a variation in composition between top and bottom of the pig.

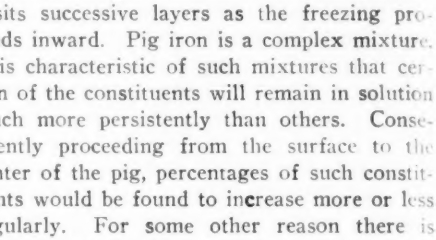


Fig. 1 (Scott) Fig. 2 (Field) Fig. 3 Fig. 4

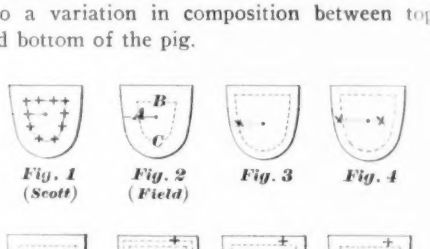


Fig. 5 Fig. 6 Fig. 7 Fig. 8

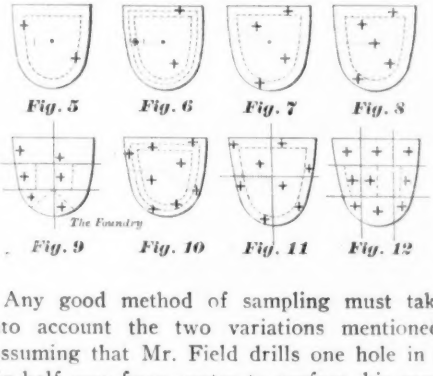


Fig. 9 Fig. 10 Fig. 11 Fig. 12

Any good method of sampling must take into account the two variations mentioned. Assuming that Mr. Field drills one hole in a pig half way from center to surface, his sample represents the deposit from the molten interior when three-fourths of the pig had solidified, and is surely not an average sample of the pig. According to whether Mr. Field drills his hole in position A, or B, or C (Fig. 2), he has an average, or an unrepresentative sample, so far as top and bottom variation is concerned. Mr. Scott's method (10 holes) is much less open to objection on both these accounts.

The positions for obtaining average samples with different numbers of holes will now be described. In Fig. 3, a dotted line 0.7 of the distance from center to surface divides the broken face into two equal areas. A single drill hole should be on this line. To take care also of top and bottom variation it should be half way down the face.

For two holes Fig. 4 is divided into two equal areas. One hole is in the middle of the outer narrow strip, the other hole is 0.7 from the center to the bounding line of the inner area. Both are midway between top and bottom. Fig. 5 gives an alternative arrangement. Neither can now be called the better.

For three holes Fig. 6 is divided into three equal areas by lines 0.58 and 0.81 from center to surface of pig. The hole in the center area is 0.7 from the center to the bounding line of the area and well toward the bottom of the pig. The hole in the intermediate area is in the middle of the narrow strip and midway from top and bottom of the pig. The hole in the outer strip is near the top of the pig.

For four holes, Fig. 7 is divided into two equal areas, and two holes put in each. For five holes, Fig. 8 is divided like Fig. 7, but the two holes in the inner area moved out a little and a fifth hole put at the center. For six holes, two holes may be put in each of the three equal areas of Fig. 6, or the arrangement in Fig. 9 may be followed, noticing that two of the holes are in the center half of the total area, and some of the other four holes are moved in a little to make allowance for the third hole that ought to be in the center half of the total area.

For eight holes, Fig. 10 is divided into two equal areas, and the inner of these again halved. Fig. 11 is fairly good, but the six holes in the outer half of the total area should be moved in somewhat. For nine holes, three holes may be put in each of the three equal areas of Fig. 6, or the arrangement in Fig. 12 may be followed.

HARRISON EVERETT ASHLEY.

The Kranks' Korner.

A Wisconsin law to the effect that "an employe cannot be discharged for being a member of a labor union" has been declared unconstitutional. A molder in the employ of the Central Foundry Co. had the foreman of the latter concern arrested for bouncing him for being a union man. The decision mentioned above is the result.

* * * * *

The less we have of laws which can not be enforced the better we are off. As for being able to discharge an employe no employer will have to lay awake nights to find an excuse which will walk around any reasonable legislation that can be made to fit this subject.

A Chicago correspondent of an Eastern journal writes his paper as follows from that city: "Jobbing foundries are fairly busy, but none are doing the amount of work expected at this time. Considerable dissatisfaction is expressed over a contract recently captured by a large company operating foundries mainly on work for other departments of their own business. The castings were taken at a price which is said to simply cover cost, for the purpose of keeping the company's foundries supplied with a large volume of work. The contract called for 8,000 tons. When the company closed the deal the contract was so divided that only 800 tons are to be made in Chicago, and the rest scattered in different cities. How far reaching such deals are cannot be told now, but local foundrymen are greatly disturbed over what they regard as an encroachment on their trade."

What the Chicago foundrymen will do remains to be seen. The concern which captured the contract has not been heard from and there are always two sides to a story.

* * * * *

Some journalistic freak has perpetrated a joke on my friend Pridmore, the molding machine man, of Chicago. He reported to his paper that Pridmore suffered the loss by fire of a core oven and 1,000 cores. The size of the latter is not mentioned. Of course if Pridmore has been guilty of putting up an inflammable core oven it is nothing but right that it should burn. Furthermore, if the aforesaid Mr. Pridmore persists in using that kind of a core oven he should be made to move that part of his works outside of the city limits.

* * * * *

There has lately been some discussion as to whether a molder shows sufficient respect to his foreman when he addresses him by his Christian name only. It has been my experience that a man will say Mister to his boss for about three days, at the end of which time he falls in the same habit as the home guards and addresses his foreman as if they had been neighbors for years.

* * * * *

To an outsider this familiarity may appear undignified, but human nature is strong, especially in the foundry, and I am satisfied that the molders respect their foreman just as much when they call him by his first name as when they append the handle used in the best society. I think when it comes to a show-

down that our best and most popular foundry foremen and superintendents are known as Tom, Bill, Jack, etc.

* * * * *

I have heard of one concern which fired their foreman because he allowed those under him to call him by his familiar first name. Of course these people were looking for style more than the quality of their castings, and the chances are they got what they paid for.

* * * * *

I notice an occasional complaint about the impudence shown by committees of molders who wait upon their employers with an armful of grievances and the manner in which they ask for redress. Sometimes I am inclined to think that the employer is to blame for this himself.

* * * * *

I think that when a set of employes have something on their mind they are acting the part of men when they appoint some one to bring it before the proper parties. Certainly no ill feeling should be shown anyone serving on a shop committee, since he represents others as well as himself. Yet those of us who have worked in different places know that too often those who serve in such a capacity are discharged at the first opportunity.

* * * * *

For this reason it is often difficult to secure an old and trusted employe to represent the working force of a shop. Probably he has got a small home and is in no shape to run the risk of being thrown out of work. The result is that the committee is made to consist of a few dare devils, who are not afraid of losing their jobs, and, should occasion demand it, are not a bit backward about using strong language to make their case clear. Now I believe it would be much better for the employer to meet those who have been with him for years, but under the circumstances are they to be blamed for letting others who have nothing at stake run the chance of getting the G. B.?

* * * * *

Dan O'Neil of San Francisco used to be one of the most popular foundry foremen on the Pacific coast. He was one of those men who first of all insisted upon good work and then fixed the time card to suit. One man might take a day longer to make a job than another one and nothing would be said as long as the casting turned out right, but let a man try to make a record, doubling up on himself so to speak, and lose the casting, and Dan would deliver a lecture the record-smasher would not soon forget.

* * * * *

While Dan appreciated a fast workman, who could at the same time be neat, he had an abhorrence of the rusher we sometimes see, hatless and panting, trying to shorten his life. On one occasion he had given me a job which I finished about two in the afternoon, being in the act of tightening the last clamp when I noticed him coming up the gangway. Approaching him I asked what I should do next. Turning around and critically surveying my floor he pointed at the pattern, which I had not returned to the proper place, and said: "Young man! put that pattern away." With that he walked away, leaving me to do some tall thinking. Ever since then I have made it a practice not to ask for another job until I am through with the one I got on my hands.

* * * * *

Quite a few employers are trying to make their employes more comfortable, not only during working hours, but also through any recess they may have to spend at the shop. With a few exceptions the foundrymen are not as forward in work along these lines as other trades. This is all the more notable because the foundries offer one of the greatest fields for improvements.

* * * * *

Most people have undoubtedly wondered whenever they have seen a dirty molder why he should not at least leave part of his black coating behind and a suggestion that a change of clothes could be effected may also have been heard. Could we follow that molder to his place of work we should likely find that there was not a place where a half decent suit of clothes could be left during the day, and that when it came to keeping clean all the facilities was an old bucket and plenty of cold water.

* * * * *

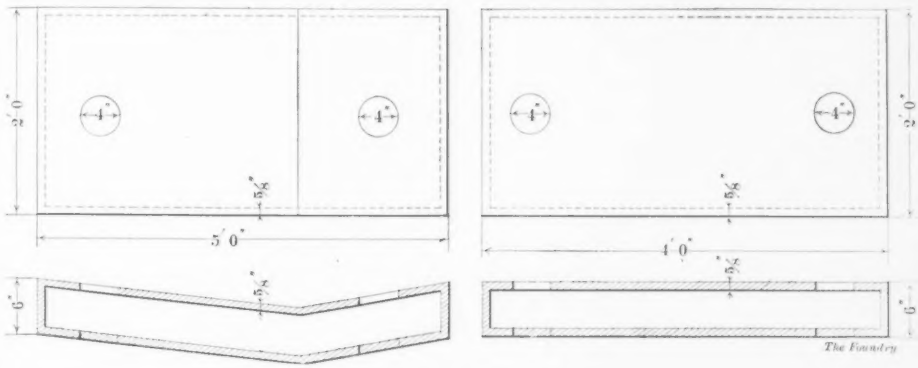
Where most employers make a mistake is in their attempt to make the workman believe that they are doing certain things for his benefit and then charging him for it afterwards. Giving a man a half holiday on Saturdays and making him shorten his noon hour on weekdays to make up for it is the kind of charity which is not appreciated.

Cracking of Water Jackets.

Would some reader of THE FOUNDRY inform me what would be a good mixture of iron for water jackets for blast furnaces for smelting copper ore, as shown in illustration? I am having trouble with these castings cracking when in use a short time.

How large a percentage of steel or wrought iron scrap can there be melted with cast iron in a 36-inch cupola for smelter work? I have trouble with blow holes and dull iron if I try over 10 per cent.

Is there any way to get rid of the sulphur that is in the scrap iron that comes from a copper smelter? W. GRIMSHAW.



CRACKING OF WATER JACKETS.

Anthracite Coal as a Cupola Fuel.

The principal mines of this coal are located in four counties of Eastern Pennsylvania, and the known area of the anthracite fields at the present time is 472 square miles, and the output of coal about 75,000,000 tons annually.

Outside of these four counties in Pennsylvania, there are only three anthracite coal mines in the United States, one in Colorado, one in New Mexico, and the third in Rhode Island. The aggregate output of these three mines is only about 60,000 tons per year, and the coal is a poor sort of anthracite.

The Pennsylvania hard coal fields are divided locally into four regions, the Lehigh, the Schuylkill, the Lackawanna and the Scranton. These various fields produce different grades of coal. That of the Lackawanna and Scranton regions are soft compared with that of the Schuylkill, and that of the Schuylkill soft compared with that of the Lehigh region.

There is also considerable difference in coal from the various mines in the same region. That from the deeper veins is generally harder than that from veins nearer the surface.

As a cupola fuel, in the days of anthracite fuel, coal from the Lehigh region ranked first, Schuylkill second, and that from the other two regions third.

Coal from various mines in these regions also had higher reputations than that from others. Of all the mines Old Mine Lehigh had the highest reputation as a cupola fuel. This coal was of a bluish cast of color, very hard and when placed in the sun in large pieces presented all the colors of the rainbow. Coal from other mines in this region have the same characteristic to a greater or less extent, but that from other regions is generally of a black cast of color, and the softer the coal the blacker it is in the fresh fracture.

Some years ago when the largest pieces of coal that could be placed in a cupola were considered necessary for a good bed, these indications of the quality of a coal were considered of importance, as they enabled the expert foundryman to judge at a glance the quality of the fuel. But at the present time, little or no attention is paid to them.

There are no records to show when this coal was first used as a cupola fuel but there are records to show that the first mine in the Pennsylvania districts was opened in 1820, and the output of coal in that year was 300 tons. It was probably about this time that the coal began to replace charcoal as a cupola and blast furnace fuel.

How many years were required to introduce it for this purpose is not known, but one thing is certain that it became the universal cupola fuel in all the eastern sections of the country and as far west as it could be obtained.

In 1875 I found it in use in many of the foundries in St. Louis, Chicago, Milwaukee,

and various parts of Canada and all the eastern section of the country.

In the early days of the manufacture of coke, coal from almost any of the anthracite coal fields of Pennsylvania was considered superior to coke, but with the improvements made in the manufacture of coke, from time to time, coal has been compelled to give place to coke, until at the present time the use of coal as a cupola fuel is restricted almost entirely to the coal fields and nearby foundry districts where it can be obtained at a less cost than coke, and to foundries a long distance from the coke centers to which coal is delivered by vessels at a less cost per ton of iron melted than coke and its use has become so restricted that we are compelled to write of it rather as a cupola fuel of the past than of the present.

To illustrate the manner of charging and melting with coal from the different coal fields of Pennsylvania I have selected from my notes three heats of about the same size melted in different sections of the country in which these fuels were most commonly used.

The first of these was melted March 25, 1876, with Lackawanna coal at the foundry of Jackson & Woodin, Berwick, Pa., a small town located near the Lackawanna or Wyoming coal fields. The iron was melted for car wheels and general car castings and was not required to be very hot to run the work.

Bed Coal	1900	Charge Iron	4350
Charge Coal	500	" "	4350
" "	600	" "	4350
" "	700	" "	4350
Total Coal	3700	Total Iron	17400

Per cent fuel 21.26+

Heat melted Sept. 26, 1876, with Schuylkill coal at the foundry of the American Stove and Hardware Co., Philadelphia, Pa. The iron was used in the casting of stove plate and hollow ware and required to be very hot and fluid to run the work.

Bed Coal	1500	Charge Iron	4000
Charge Coal	350	" "	4000
" "	350	" "	4000
" "	350	" "	4000
" "	250	" "	2000
Total Coal	2800	Total Iron	18000

Per cent fuel 15.55+

Heat melted Jan 15, 1877, with old mine Lehigh coal, at the foundry of the Wolf Stove Works, Troy, N. Y., very hot fluid iron for light plate was melted in this heat.

Bed Coal	1400	Charge Iron	4000
Charge Coal	300	" "	4000
" "	300	" "	4000
" "	250	" "	3000
" "	250	" "	3100
Total Coal	2500	Total Iron	18100

Per cent fuel 13.81.

It will be observed that the weight of fuel in the first heat is increased each charge and the charges of iron remain the same throughout the entire heat, while the weight of fuel in the charges with the harder coal remains the same as long as the weight of iron remains the same and is decreased as the weight of iron decreases.

In melting with coal it has been found that with the softer coals the bed gives out in a long heat resulting in dull iron towards the latter end of the heat.

To obviate this, the charges of fuel are increased to keep up the bed and prevent iron settling too low in the melting zone before melting. This is the mode of charging commonly followed when melting with soft coal.

It will also be observed that the per cent of coal consumed in melting varies to a considerable extent. This is due in these heats to the quality of coal. This variation always occurs with the different coals under the most favorable conditions and is due to the difference in the heat producing units of the coal.

The following reports from fourteen large foundries located in different parts of the country and using different grades of coal show the per cent of coal consumed in melting for one year to have been 15.55, 14.51, 15.17, 17.22, 16.12, 15.08, 15.48, 14.70, 14.95, 18.10, 20.00, 18.72, 20.39, 19.78.

The foundries are principally stove plate foundries and foundries casting light work for which very hot iron is required, and they show the average melting done in well regulated foundries of this class.

Founders and melters who are accustomed to speaking of pounds of iron melted to the pound of fuel may at first glance, as we have known them to do, take these figures to mean, pounds of iron melted with a pound of fuel, which is not the case. They represent the pounds and fraction of a pound of fuel consumed in melting one hundred pounds of iron.

Prior to the dates above given every foundry appears to have been a mystery unto itself, and nothing was published in regard to cupola fuel and it was only by promise of absolute secrecy, as to the founder furnishing them that these figures were obtained.

Prior to this date and even at the time, it was the practice in many foundries to use in melting the largest pieces of coal they could obtain or place in the cupola, such coal was considered necessary to make a bed that would last through a heat of two or three hours.

I have seen the largest pieces of coal a

man could lift and place in a cupola put in for a bed and low cupolas of from eight to ten feet filled with wood almost to the charging door to ignite these large pieces of coal, smaller pieces were used for charging, but they were generally entirely too large for this purpose.

This large coal did not make a compact fire and large crevices or openings were left between them, through which the molten iron quickly dropped to the bottom of the cupola without being superheated in its descent and it was only by using an excessive amount of coal that hot iron could be made. The average melting done, with this kind of fuel, when hot iron was required, was from three to four pounds of iron to the pound of fuel with the best of coal.

Later on it was the practice in many foundries to put in a bed of large coal and charge with small coal; this gave a better per cent and the average melting was from four or five to one.

The writer was probably the first to call foundrymen's attention to this mistake in using coal, and while it is claimed by many that a cupola cannot be run by a book, my early work on cupola practice certainly revolutionized the use of coal in many sections of the country.

At the time it was published, many old founders and melters ridiculed the idea of melting with small coal and were so positive it could not be done that numerous bets of from one hundred to five hundred dollars were offered that it could not be done and a long heat melted or hot iron made.

But these primitive ideas of using coal soon gave way to better judgment when once their attention had been called to the matter, and the use of small coal became universal.

Iron may be melted in a cupola with any size coal from the smallest to the largest if the quality of coal is good, the best results are obtained in either small or large heats with broken coal about the size of the fist or of the two fists, and no larger coal should be used either for large or small cupolas.

After the adoption of broken coal for melting, the per cent of coal required for making hot iron was very much reduced, and the average melting in well managed cupolas in large and small heats was from five to seven to one, and in some cases as high as seven and a half was obtained. This was probably the best ever done, although there were founders and melters who claimed as high as ten to one, but I have never seen any such melting done either in regular or test heats, and men doing such melting probably did it in their minds, as many do at the present time who melt with a very small per cent of coke.

When coke was first introduced into the coal melting districts of the eastern section of the country, many founders were afraid to use it in their cupolas and it was introduced by mixing it with coal, or by putting in a bed of coal and charging with coke or with coke and coal and this practice is still kept up in many foundries, where the two fuels can be obtained at the same price per ton of iron melted. It being claimed that a coal bed lasts longer than a coke bed and also a mixture of the two fuels in the bed and charges makes a hotter iron and gives life and fluidity to the molten iron.

There is nothing in any of these claims for a bed of one fuel will last as long as the other and as hot, fluid and lively iron can be melted with one fuel as with the other, or with a mixture of the two fuels.

Another claim made for the mixture of the two fuels is, that more rapid melting can be done and larger heats melted with mixed fuels than with coal alone.

There is some truth in this claim and founders melting with coal can do more rapid melting and may increase the melting capacity of their cupolas by mixing the two fuels in the bed and charges or in the charges alone, or by putting in a bed of coal and charging with coke.

The following heats melted with mixed fuels will illustrate the manner of charging and melting with the two fuels.

Heat melted in a 48 inch Colliau cupola with No. 6 Baker blower, tuyeres 18 inches above the bottom, Schuylkill coal and Connellsville coke used in melting. Iron melted for general machine castings.

Bed	Coke	Bed	Coal	Bed	Iron
"	1200	"	600	"	4000
Charge	250	Charge	100	Charge	4000
"	250	"	100	"	4000
"	250	"	100	"	4000
"	250	"	100	"	4000
"	250	"	100	"	4000
"	250	"	100	"	4000
"	250	"	100	"	4000
"	250	"	100	"	4000
Total,	3200	Total,	1400	Total,	36000

Per cent coke 3.88+ Per cent fuel 12.77

" " coal 8.88+

Heat melted in 54 inch Whiting cupola with No. 6 Baker blower, tuyeres 18 inches above bottom, Schuylkill coal and Connellsville coke

used in melting. Iron melted for light malleables and required to be very hot.

Bed	Coal 2800	Bed	Coke 60	Bed	Iron 3200
Charge	150	Charge	60	Charge	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
"	150	"	50	"	1900
Total,	4900	Total,	770	Total,	29800

Per cent fuel 19.02 — Per cent coke 2.58; " " coal 16.44

In the first heat, the per cent of coke predominates and was employed to do fast melting. The coal was used to give more body to the fuel and make hotter iron. In this case, the coke in the bed and charges was put in first and the coal on top of it. In the second heat, the per cent of coal predominates, it being the cheaper fuel in this instance and the small per cent of coke was employed to make the cupola work more open and free.

In this case, the coke was put in on top of the coal, as is generally done when coke is used for this purpose.

The two fuels are also used in various other ways. In some foundries, a bed is put in entirely of coal and charging done with coke alone, in others, the bed is made of equal parts of coal and coke and the charges of the same proportions. In such cases, it is the practice to put in the coke first and the coal on top.

Coal, unlike coke, is useless as a fuel after it has been subjected to the intense heat of a cupola and cooled again, although the coal when broken appears to be as good in the center as before heating. I do not know of any analysis having been made to determine the cause of this; but it has been demonstrated that it cannot be burned alone in a core oven furnace or in a heating stove, and when mixed with fresh coal tends to deaden the fire and decrease the heat rather than increase it; and when placed in the cupola with fresh coal probably produces no heat. It does not pay to recover such coal from the cupola dump for heating purposes.

EDWARD KIRK.

Differs with Mr. Keep.

Mr. Keep's remarks on "Fire Cracking of Castings" p. 223 of the Jan. number that—"to thicken the casting where it becomes hot first which will make it heat slower at that point" is not a proper statement of what occurs. What he should have said was by thickening this part of the casting you produce by its contraction in cooling after the other parts of the casting have cooled a strain which is relieved when the fire plays upon it and does not cause an expansion strain. If you thicken the part and cast it in a way not to have this cooling strain left, it will do no good. You can overdo the thickening business by causing the casting to spring before it sees the fire at all, perhaps before it is out of the mold. So that you can only thicken it as much as you dare.

GEORGE G. URE.

But One Way.

In the article on "Mixing Iron by Analysis" by Mr. W. G. Scott in the April *Foundry*, mention is made of two ways of writing per cent. There should be but one way. "Per cent" is from the Latin meaning "to the hundred." Thus 12.50 per cent is twelve and a half parts to the hundred parts. If it is desired to express the same fact in parts per unit, then say 0.125 *per unit;* that is, one hundred twenty-five thousandths per unit.

HARRISON EVERETT ASHLEY.

Casting Metal.

As is well known, some metals are unsuitable for casting, while others, like iron, can readily be cast in any desired shape. The property of casting well is said to depend upon whether the metal contracts or expands on solidifying from the liquid form. Iron, like water, expands in solidifying, and hence the solid metal may be seen floating in the liquid iron about it. The expansion causes it to fill the die into which it is poured, and so it can be cast easily. Gold and silver contract in cooling and therefore are not suitable for casting.—[Item from a Western Journal.

(The author of the above should make a few experiments which would likely teach him that the patternmaker cannot yet afford to discard his shrink-rule.)

Spring Opening.

D. D. Wolfe opened his foundry last week for spring trade and solicits the patronage of all who use anything in his line.—[Vienna Correspondence Washington (N. J.) Star.

The Associated Iron Molders of Scotland at the close of 1900 had a membership of 7,184.

CAST IRON NOTES.

Devoted to inquiries from Practical Foundrymen on the subject of Melting and Using Cast Iron. Address all inquiries to W. J. KEEP, care of The Foundry.

CASTINGS OF VERY LOW SHRINKAGE.

The casting sent me was a one-half inch square test bar which had broken in three pieces, each fracture being through the mark of a gate. At these points, where the iron entered, the surface of the bar had shrunk away more than one-sixteenth inch and back of one gate was a shrink hole three-sixteenths inch round, with spongy grains reaching to the gate.

The shrinkage of this test bar per foot was 115 and the calculated silicon was 2.98 per cent. The fracture glistened and the low shrinkage indicated 3.50 per cent silicon. Evidently some pig iron purchased as having low silicon had a much larger percentage. Such fortunate purchases occur in buying iron by fracture. The grain was probably as close as No. 3, but it was probably No. 2 soft. Increasing the low silicon iron to bring the shrinkage to .125 would cheapen the mixture.

This shrinkage of a casting out of shape can be prevented by a change in proportion of the mixture without changing the analysis. The iron remained fluid too long after the mold was filled. The test record showed the strength of this half-inch bar to be 470 lbs., which is quite above the average. The test bar had been tumbled along with other castings. A test bar should be tested just as it comes from the sand. Tumbling strengthens a test bar 10 to 20 per cent by hammering and smoothing the surface. I make only one flask containing two one-half inch square bars. I use a yoke on only one for shrinkage. I do not grind the bar at all but measure the shrinkage and test the strength just as it comes from the sand.

A day or two before I received a hand wheel with a rim 1¼ inches round section and arms one-half inch thick and three-quarter inch wide. In the rim over the junction of the arm was a shrink hole one inch long, three-eighths inch wide and one-half inch deep. The analysis of the mixture was G. C. 3.25, C. C. 0.16, Si. 2.49, P. 0.88, S. 0.129. I was suspicious that this casting contained more than 2.49 Si. At any rate it was too high for that size and proportion of casting unless the grain could be closed by adding cast iron borings or close grained scrap.

DOES CHARCOAL IRON EXPAND MORE BY HEAT APPLIED TO ITS SURFACE THAN COKE OR ANTHRACITE IRON?

Question.—We used soft anthracite iron for the cylinders of air-cooled gasoline engines, which gave good results. In order to get the castings more sound we used hard charcoal iron. On running the engines made from the charcoal iron, when they heat up the cylinders seem to expand away from the piston, causing the engine to pound, a great deal more than with the anthracite iron.

Answer.—The reason that the castings made with anthracite iron were unsound was that it contained too much silicon. By changing the mixture and adding anthracite iron with less silicon you would have got good castings, or better still by adding good clean machinery scrap or stove plate.

The more silicon the less expansion by heat, but there would be no difference between anthracite and charcoal or coke iron having the same silicon. It would seem that you went to an extreme and if, as I have suggested, you made less change and used more fine-grained scrap you would get close-grained soft castings and cheapen your mixtures. You say in your letter that you drill the cylinders and tap for 1900 threaded pins for radiation of heat. If you made a core or mold with the same number of holes punched in it the pins would be cast and being a part of the casting would carry away heat better.

Consolidation of Ingot Mold Manufacturers.

The American Ingot Mold Co. of Pittsburg has been organized with a capital of $50,000, to take over the ingot mold plants of six foundries and to combine them ultimately in one large plant. A Pennsylvania charter has been applied for and when granted the capital will be increased to $2,000,000. The new concern will take charge of the plants on July 1. The six plants to be combined are as follows: The ingot mold department of the Mesta Machine Co. at West Homestead, Pa.; the Marshall Foundry & Structural Co. of Pittsburg; the Thomas D. West Foundry Co. of Sharpsville, Pa.; the ingot mold department of the Vulcan Foundry and Machine Co., New Castle, Pa.; the ingot mold department of Wm. Yagle & Co., Pittsburg, Pa., and James E. Thomas of Newark, O. The six plants have an annual production of 150,000 tons of ingot molds while the consumption is estimated at

not over 100,000 tons. The combination has been formed both for the purpose of reducing operating expenses and for cutting down the cost of production. In fact this latter item is the most important. Many of the large steel producers cast their own molds with the result that the mold makers have been cut out of a large amount of business.

At the present time the American Steel & Wire Co. is preparing to install a mold foundry on Neville island to manufacture molds for the Shoenberger plant and for the plants at Cleveland, O. Jones & Laughlins, Ltd., who have always been large buyers of molds, are also going into their manufacture for their own use. The Carnegie Steel Co. operates a mold foundry at its Edgar Thomson Works and the production is not only large enough for the Carnegie plants but it is said molds have been made for other large steel producers. By the reduction of expenses possible through the consolidation it is believed the steel manufacturers may be induced to purchase their molds instead of manufacturing them. One of the largest items of expense at present to each of the manufacturers is for patterns. The manufacture of new patterns for nearly every order will largely be obviated by the combination. The new company has been organized by W. D. Marshall, George Mesta, William Yagle, George H. Boyd, and J. S. Kaufman.

Among the Foundries.

The Wellman-Seaver Engineering Co. of Cleveland, has recently purchased a large tract of land, situated on the Cleveland & Pittsburg Railroad, between Central Avenue and Quincy St., Cleveland. Work will begin soon on the erection of a large engineering plant, which will comprise a machine shop 570 feet long by 128 feet wide, a large blacksmith shop about 100 feet by 100 feet, a large pattern making and storage shop, a boiler and power house 70 feet by 58 feet. Space is left for a steel and iron foundry 700 feet long by 105 feet wide, which it is in contemplation to erect in the near future. These buildings will be entirely fire proof, and of the most modern and up-to-date type. Nearly all of the tools will be driven direct by electric motors. The extraordinary success which this company has attained has compelled the building of this plant. It has a very large amount of work on hand, the orders on its books today being more than fifty per cent in excess of the entire business done by the company in 1900. Among other contracts booked recently is a large amount of work for Spain and also for England and Japan. The company has also just been awarded a contract by the Lackawanna Iron & Steel Co. for the entire ore unloading and handling outfit for its new works near Buffalo.

The property of the Two Rivers Iron Works of Two Rivers, Wis., was sold to the Bank of Two Rivers recently on a forced sale. It is stated that the foundry will be reopened shortly.

The Parlin & Orendorff Co., Canton, Ill., manufacturer of agricultural implements, is having plans prepared for a building 90x288 feet, to be added to its foundry, a 100x120 foot building equipped with coal conveyors, to be added to its malleable iron department, and a three-story warehouse, 416x91 feet, in which two freight elevators and a sprinkler system will be installed.

The rebuilding of the plant of the New York Car Wheel Co., at Buffalo, has been hurried along since the fire on March 6, and 24 days afterward one of the foundries was again in operation. This building is 200 feet long and 70 feet wide. The capacity of the plant destroyed was 450 car wheels a day. The newly opened foundry will turn out 250 wheels daily, and the output of the plant when entirely rebuilt will be 700 wheels daily.

The Arizona & Sonora Mfg. Company has been incorporated at Nogales, Ariz., with a capital stock of $100,000 for the purpose of carrying on a general foundry and machine shop business. The incorporators are Edward Titcomb, L. W. Mix, L. Lindsay and William H. Hoey. The new company will be in the market shortly for a complete equipment.

The American Valve Co. of Coxsackie, N. Y., has been incorporated with a capital stock of $50,000, to manufacture iron and brass valves, water works and steamfitting supplies. The president is Charles W. Weller; vice president, Edward J. Kiley; secretary, Edwin F. Tiel; treasurer, D. G. Greene. A site will shortly be selected, and it is expected that business will be opened early in the autumn.

The Canadian Bronze Co., Montreal, has applied for incorporation with a capital stock of $75,000, to manufacture bronze or brass castings, etc. The provisional directors include L. E. Tate, St. Thomas, Ont.; B. M. Tate, Buffalo, N. Y., and J. S. Robertson, St. Thomas.

The Hardoin Brass Works of Detroit, Mich.,

has been incorporated with a capital of $20,000.

The Pomona Foundry & Machine Co. of Pomona, Cal., has been incorporated with a capital of $50,000. G. A. Carter, D. R. Knull, A. E. Brown, R. M. Furlong and Henry Newby are the incorporators.

Moore & White Co. of Philadelphia is building a three-story brick addition which will be used as a pattern-making and pattern storage department.

The Craig Ridgway & Son Co. of Coatesville, Pa., builders of the well-known "Ridgway" cranes and air hoists, are extending their foundry and furnishing the new addition with all modern improvements.

The new brass foundry which is being erected by the Westinghouse Electric & Mfg. Co. at East Pittsburg will be completed about May 1. The foundry will be located in two buildings each 419 feet in length.

The Pawtucket (R. I.) Foundry Co. has started its new plant, which is a model one, being equipped with all the latest machinery. Fred A. Thomas, formerly of the City Iron Foundry of Woonsocket, is the manager of the new plant, which, when in full operation, will give employment to about 75 people. George Dundas will be the foreman, having held a similar position at the plant in Woonsocket.

Thomas J. McDermott of Biddeford, Me., has purchased the foundry of Daniel T. Kelly & Sons at Portland, Me., and will operate it as a general jobbing foundry.

The A. R. Dempster Mfg. Co., of Des Moines, Ia., has purchased property adjoining its plant upon which a new foundry and machine shop will be erected.

The Kerr-Murray Mfg. Co.'s plant, Fort Wayne, Ind., recently damaged quite seriously by fire, is to be rebuilt at once. The foundry was saved, but the machine shop, pattern shop and offices were destroyed. The loss was about $40,000, well covered by insurance.

The Root Bros. Co., Plymouth, O., is building an addition, 40x100 feet, to its foundry.

The Gordon Foundry & Machine Co., St. Joseph, Mo., has let the contract for a new foundry and machine shop. The building will be of corrugated iron, one story, 204x40 feet, and will cost about $10,000. Machinery of the latest design will be installed, and it is expected that the plant will be in operation by June 1. Heretofore the company has confined itself to the manufacture of the Biehlen stone saw, but with the increased facilities provided by their new plant they intend doing all kinds of foundry and machine work.

Salisbury & Satterlee are building a new foundry, 40x110 feet, at Minneapolis, Minn., for the manufacture of iron beds.

The Fair-Day Foundry Co., Knoxville, Tenn., stove and general founders, has changed its name to the Fair Foundry Company. A. B. Day, formerly vice president and superintendent, has retired from the company. The officers are D. C. Richards, president; J. E. Fair, secretary, treasurer and general manager.

The Sullivan Machinery Co., Claremont, N. H., manufacturers of Sullivan core drills, channelers, gadders, coal mining machines, etc., have increased their capital stock from $600,000 to $800,000.

The New Castle Sanitary Supply Co. of New Castle, Pa., has been organized with a capital of $200,000. The company will manufacture all kinds of sanitary supplies and specialties.

The S. Obermayer Co., Cincinnati and Chicago, are remodeling their plant at Larimer, Pa. The plant is to be overhauled, new machinery installed, and the capacity materially increased.

Geo. A. Ray Mfg. Co., who recently incorporated, have succeeded to the business and plant of the Aldrich & Ray Mfg. Company, copper and brass goods, Buffalo, N. Y. The new company will manufacture the same line of goods as the former, only on a much larger scale.

Seiberling & Miller, whose large mower and reaper plant at Doylestown, Ohio, was recently burned, will likely rebuild at that place, unless inducements offered elsewhere are sufficient to cover loss by removal, damages, etc.

The J. H. McLain Co. of Canton, Ohio, has added a new department to its plant which will be devoted to the manufacture of radiators.

The Newport News Shipbuilding & Dry Dock Co. will build a foundry at their plant at Newport News, Va., to cost about $50,000. It will be specially designed for shipyard work, particularly brass castings, and will be in operation within three months.

The Union Iron Works, Decatur, Ill., are to be enlarged and the machinery equipment will be considerably increased.

The Wheeling Mold & Foundry Co., Wheeling, W. Va., manufacturers of machinery and iron castings, sand and chilled rolls, have broken ground for their new works to be built

on a site of 4 acres, just outside Wheeling, and have some of their heavy machinery under way. The main building will be of brick, with slate roof, and will be 280x110 feet. The cupola capacity of the foundry will be 30 tons daily and a 20-ton air furnace will be installed. The foundry and machine shop will be located in the main building, the former being 180x110 feet and the latter 100x110 feet. The foundry will be commanded by a 20-ton crane and the machine shop by a 15-ton crane. The plant will probably be ready for running in June. The output will consist of sand and chilled rolls, heavy housings and general castings for heavy machine work. The firm are now running their brass foundry at the old works.

Brown & Son have purchased the old Shoemaker foundry at Ebensburg, Pa., and will operate same under the name of the Ebensburg Foundry & Machine Co.

H. S. Pryne has purchased the City Iron Foundry at Woonsocket, R. I.

The Bonnott Co. of Canton, Ohio, are equipping their shop with pneumatic machinery throughout.

Wm. A. Hulshart & Co. of Morrisville, Ind., have put their foundry in operation.

The Walker Manufacturing Co. succeeds the Fenton Iron Works, Fenton, Mich. Officers have been elected as follows: President, M. Walker; vice president, W. E. Scott; secretary and treasurer, C. J. Campbell; auditor, F. A. Peavey. It is the intention of the new company to manufacture pumping engines and other water works appliances as heretofore, but the business will be largely increased by the manufacture of various articles in other lines. New machinery will be added and the plant enlarged so as to give employment to three times the number of workmen now employed. The capital stock of the new concern is $25,000, fully paid in.

Chas. B. Hammett, Tuscola, Ill., is building a substantial addition to his foundry.

Samuel J. Benedict, East Randolph, N. Y., will move his foundry and machine shops to Salamanca, N. Y., and consolidate with the Benedict Mfg. Co. It is the intention of the company to erect four large frame buildings, including boiler, blacksmith, machine and molding shops. They will manufacture engines and boilers and do all kinds of machine work.

The plant of the Corning Iron Works Co.'s foundry, Corning, N. Y., will be enlarged by the addition of a brick molding room 162x60 feet, and a chipping and grinding room 30x80 feet. A new 72-inch cupola will also be added, thus making three large 6-foot cupola furnaces running daily on jobbing work and cast iron specialties.

The Franklin Foundry Co., whose plant at 1155 to 1165 South Paulina street, Chicago, was recently destroyed by fire, has several buildings under course of erection to replace those that were burned. The main foundry room when finished will be 65x120 feet, a smaller one will be 60x120, the machine shop will be 50x100 and the blacksmith shop will be 60x80 feet. The plant is to be equipped with several cranes and the latest foundry and machine shop appliances, and when finished will be one of the most complete of its kind in Chicago. The company is now booking orders for castings, architectural iron work and soil pipe, and hope to be in operation by May 1.

R. C. Bartley & Co., Bartley, N. J., manufacturers of Favorite heaters and supplies and dealers in wrought iron pipe, fittings, etc., are building a new foundry about 32x100 feet and a dam to flood 5 acres to furnish water power. A Sovereign turbine water wheel will be installed and the plant otherwise equipped with improved appliances. The Central Railroad Co. have placed a siding in the yard, giving improved shipping facilities. The present foundry will be used for storage.

At the annual meeting of the stockholders of the Seaboard Steel Casting Co., held at Chester, Pa., April 8, Joseph Wharton, Isaac H. Clothier and Edwin S. Cramp of Philadelphia, Thomas H. Favery of Wilmington, Del., J. Henry Cochran of Williamsport, John B. Roach and William C. Sproul of Chester were elected directors. Senator Sproul was reelected president and the construction of a large pattern warehouse and a wharf were authorized.

The Nagle Engine & Boiler Works will erect an addition to their shops at Erie, Pa., which will cost about $20,000.

The partnership of Gordon & Brown, general foundry and machine works, Moundsville, W. Va., will be dissolved. The plant of this concern was recently burned.

James Barker, iron founder and machinist, Second and Somerset streets, Philadelphia, Pa., will in the near future remove from the present location to a much larger site at Sixth, Cayuga and Wingohocking streets, adjoining the North Penn. branch of the Philadelphia & Reading Railroad. The new plant will be of sufficient size to double the present capacity.

The organization of the Perham-Stickney

Co., Lowell, Mass., has been completed, capital, $1,000,000. The works are located at Atherton, suburb of Lowell, being formerly occupied by the Atherton Machine Co., for the manufacture of cotton machinery.

The Union Casting Co., Cincinnati, composed of local men, with W. H. Linton as manager, has leased the building at 618 West Fifth St., for making brass, aluminum and composition castings. The company will eventually equip a machine shop to manufacture an article upon which patents are now pending.

The Southern Foundry & Machine Co. of Owensboro, Ky., recently organized with a capital of $40,000, is now building a new plant. The officers are L. Freeman Little, president; Louis D. Baer, vice president; M. F. Bransford, secretary; Jas. H. Parrish, treasurer.

The Spence-Baggs Stove Co. of Martin's Ferry, O., has awarded a contract for an additional plant. The company will add a new molding room. In other departments additions will also be made.

The machine shops of John F. Riley, at Charlestown, S. C., were completely destroyed by fire, the loss being estimated at $10,000.

The Bovaird & Seyfang Manufacturing Co. of Bradford, Pa., manufacturers of boilers, engines, etc., contemplate the rebuilding of their shops.

The Buhl Malleable Co. of Detroit, Mich., has increased its capital stock to $100,000. The company is now building an addition to its foundry to accommodate a continually increasing trade.

The Emerson Pump Co. has been incorporated at Alexandria, Va., with a capital of $500,000, and the following officers: Henry P. Woodward, president; Richard Young, vice president; Chas. E. Wood, secretary, and Robert H. Graham, treasurer.

At a recent meeting of the stockholders of the Wrightsville Hardware Co., of Wrightsville, Pa., it was decided to increase the capital stock from $25,000 to $100,000.

The Niver Iron Works at Muscatine, Iowa, will build an addition to its foundry.

Work is beginning at Warren, O., on buildings for the McMyler Manufacturing Co., maker of hoisting machinery, which is to be moved there from Cleveland.

The Quincy (Ill.) Engine Works has been organized to manufacture the Williams engine. The company's capital is given as $250,000, and machine shop and foundry will be built at a cost of $120,000.

The G. D. Von Phul Co., Limited, has been incorporated at New Orleans, La., with capital stock of $15,000, for the establishment and operation of brass and iron foundries and machine shops, and for the manufacture and repair of agricultural implements, machinery, etc. G. D. Von Phul is president; Henry L. Fuqua, vice president, and Randolph Matta, secretary.

The Dobbie Foundry & Machine Co., Niagara Falls, has changed proprietorship and management, John Dobbie and A. J. Dobbie having sold a majority of stock to John B. Henderson of Paris, Ont., and D. B. Crombie, of Thorold, Ont. Mr. Henderson has become president and A. J. Porter of Niagara Falls, secretary, with A. T. Throop treasurer and general manager.

Application has been made for a change in the corporate name of the Totten and Hogg Iron & Steel Foundry Co., Pittsburg, to the George A. Hogg Iron & Steel Foundry Co. Mr. George A. Hogg is the president and principal stockholder in the company, which makes sand and chilled rolls, rolling mill and tin plate machinery, mill engines, etc.

The Hooven, Owens & Rentschler Co. of Hamilton, O., will shortly be incorporated with a capital stock of $2,000,000, half common and half preferred. The increased capital is to provide for the enlargement of the present plant, and the construction of the Hamilton Corliss engine will be carried on on a more extensive basis than ever before. Since 1883 this company has been engaged in the exclusive manufacture of Corliss engines and since then more than 4,000 have been built. The present officers of the company are J. C. Hooven, president; George A. Rentschler, vice president; Henry Sohn, secretary and treasurer.

The Xander Machine & Supply Co., Limited, who recently incorporated, have opened a general machine shop and supply depot at 926-930 Bingaman street, Reading, Pa. Special attention will be given to mill and manufacturers' supplies and making brass castings to order. J. G. Xander, W. G. Schaeffer and A. J. Schartle are the parties interested.

The Maryland Foundry & Machine Co. have purchased the business of the Snowden & Cowman Mfg. Co., at Baltimore, Md. The plant consists of an iron and brass foundry and large machine shop, and special attention will be given to the making of all kinds of patterns, castings, machinery, and repairs. Thos. P. Stran, Jr., is president, and T. Frank Wilhelm manager.

The Kern County Iron Works, who recently incorporated at Bakersfield, Cal., are building

a new plant, consisting of a forging shop, machine shop and foundry, for the purpose of manufacturing and repairing all kinds of oil well tools and supplies. Machinery of the latest kind will be installed, some of which has been purchased. The officers are A. W. Freeman, president; C. E. Lawry, vice president; P. Standley Twells, secretary; R. D. Miller, treasurer; W. H. Hoxie, superintendent.

The Whiteley Malleable Castings Co., Muncie, Ind., have taken up the manufacture of malleable castings for cars and other specialties for which they have orders booked for several thousand tons. The company are now extending their molding space to enable them to use at least 50 additional good molders, to whom they can give employment at once, with steady work.

H. R. Ousler, proprietor of Suffolk Iron & Brass Foundry, at Suffolk, Va., is building a new foundry to replace the old one. The new buildings will be used for pattern shop, storage, etc.

The American Steel Casting Co., with principal offices at Chester, Pa., will very much enlarge the capacity of its Sharon works, at Sharon, Pa. The capacity will be increased about 25 per cent.

The Rusden Machine Co., Warren, R. I., have put in a brass foundry in connection with the machine works.

The Hamilton Foundry & Machine Co., Hamilton, O., manufacturer of light castings, is erecting a new addition to its plant for foundry purposes 100x125 feet. This will make the main foundry 100x325 feet, with an extra side wing 50x100 feet. The officers are G. A. Rentschler, president; Fred. Thoma, vice president and manager; H. A. Rentschler, secretary and treasurer.

The Scullin-Gallagher Iron & Steel Co., St. Louis, manufacturers of high grade open hearth steel castings up to 60,000 pounds, report an abundance of orders. They are contemplating making additions to their plant, which has been but a comparatively short time in operation. They also make a special metal for electrical purposes.

The William Ferguson Foundry Co., Hawthorne and Willow streets, Chicago, have built a new office and have extended their foundry space. They have also installed new equipment, including an electric crane.

John Ramsay, Ohio and Kingsbury streets, Chicago, who is building a new foundry at Sixteenth and Lincoln streets, expects to move into the new plant about May 1. The foundry building is to be 100x200 feet, and of brick and steel construction. The plant is to be equipped with the latest machinery, including a 20-ton electric crane, and a 50-inch cupola.

The National Steel Casting Co., Montpelier, Ind., manufacturer of open hearth steel castings, expects to spend from $60,000 to $70,000 in improvements, putting in an additional acid bottom furnace, a 20-ton basic furnace and a 36-pot crucible furnace. They will build a 160-foot addition to the foundry, in which another large electric crane and several machines will be installed. When these improvements are completed they expect to employ about 300 men. The company own several large gas wells and will be in a position to fill orders promptly. The officers are G. Max Hofmann, president; James O'Donnell, vice president; John R. Sinclair, secretary; Charles S. Bash, treasurer.

The W. W. Whitehead Co. of Davenport, Iowa, is building a new plant for the manufacture of boilers and engines.

The erection of a new iron foundry at Lachine, Quebec, has been begun by the James Cooper Manufacturing Co. for the manufacture of mining machinery. The cost of the enterprise will be about $250,000, and when completed, it will employ some 300 or 400 hands.

The Dawson (Ohio) Foundry will build an addition to its plant.

The Watsontown (Pa.) Foundry Co. has been organized with T. K. Smith, president; B. F. Fisher, secretary; Wm. R. Bly, treasurer, and Chas. H. Ellis, manager and superintendent. Operations will be commenced at once.

The Chicago Hardware Mfg. Co., at North Chicago, Ill., is building a 70x80 foot addition.

The Aetna Foundry & Machine Co. of Warren, O., is making a specialty of annealing boxes for tin mills.

As soon as the weather will permit, the Stoever Foundry & Mfg. Co. of Myerstown, Pa., will erect a large machine shop and enlarge their foundry so as to double their present capacity. The additions will be equipped with most improved appliances, some of which have already been purchased, the remainder being filled in as necessity requires. Heretofore the company have had a great deal of work done elsewhere, and as soon as the extensions are completed they will be able to do all their own work, and besides their present specialty—boiler fronts and castings—they in-

tend branching out into other lines of foundry work, also work in brass.

The Columbia Heating Co. of Belvidere, Ill., will build a new foundry and machine shop.

In the Birmingham, Alabama, district considerable business is being done in the foundry line. The Hood Machine Co. will build a fire proof plant to cost between $25,000 and $30,000. It will be two stories in height and 80x150 feet in size and is to be completely equipped with pneumatic and electrical appliances. The Hardie-Tynes Foundry & Machine Co. is rushing work on its plant to replace the one burned some time ago. This is also to be equipped with electric cranes and the best of appliances for heavy work. The Birmingham Foundry & Machine Co. is busy on a heavy order for Corliss engines, which are to go to Cuba.

Stove founding has reached the greatest perfection in the United States, and as the center of population has shifted westward, the trade has followed the same course. Few would expect stove foundries to flourish as far west as Kansas, where the raw material costs an increased figure. Nevertheless, last year the Great Western Stove Co. of Leavenworth, Kansas, turned out 38,000 stoves of various kinds, and is now preparing to enter the steel range business.

Hudson & Sharp of Green Bay, Wis., are building an addition to their foundry.

The Penn Steel Casting Co. of Chester, Pa., will enlarge its main foundry by an addition 100x200 feet in size. Another 20-ton open hearth furnace and a fifty-ton crane will be installed, which will practically double the capacity of this plant.

The Marion Malleable Iron Works, Marion, Ind., are building an addition 80x40 feet to their foundry to increase their molding capacity.

The Engelberg Huller Co., Syracuse, N. Y., have completed their new building in West Fayette street. It is one story high, of steel construction, 32x132 feet, and will be used for making gray iron and brass castings. Heretofore the company have had their castings made outside their own plant.

Cyrus Currier & Sons, machinists and founders, contemplate building a new foundry, which will contain three times as much floor space as they now have at their plant in Newark, N. J.

The American Steel Casting Co. will greatly enlarge their plant at Sharon, Pa. The contract for a large steel frame building to be covered with corrugated iron has been placed with the Riter-Conley Mfg. Co. of Pittsburgh.

E. M. Haubold will erect a $10,000 iron foundry at Harrison, Ark.

F. R. Patch Mfg. Co., Rutland, Vt., have increased their floor space by an addition 16x82 feet to their foundry.

The Wm. B. Pollock Co., Youngstown, O., have sold their present plant and ground to the Wm. Tod Co. of that city, and will erect a large foundry and machine shops on the old Himrod Furnace site, which the firm have bought. The new works to be erected by the Wm. B. Pollock Co. will be much larger than the present shops, giving the concern better and larger facilities for the building of steel plate construction, blast furnaces, steel works, rolling mills, self-supporting chimneys, riveted pipe, converters, ladles and all kinds of rolling mill machinery. Wm. B. Pollock is president of the concern. Porter Pollock is general manager, W. G. Wilson secretary and treasurer. C. W. McClure is general manager, and W. W. McKelvey superintendent.

The Columbus Iron Works Co., Columbus, Ga., is building a new foundry 75x225 feet.

The J. A. Oberhelman Foundry Co. of Cincinnati, has been organized with a capital stock of $40,000. The incorporators are John A. Oberhelman, Clara Oberhelman, Edward Oberhelman, William Oberhelman and James Finneran.

The Heating & Ventilating Foundry Co. has been formed at Wellsburg, W. Va., by S. George, B. F. Harden and Henry Stengel. A plant will be fitted up at Lazearville, a suburb of Wellsburg.

The Piedmont Foundry & Machine Co. of Westernport, Md., has been incorporated by Robert Smith, James Smith and Charles T. Boon, all of Westernport, and D. James Blackiston and Benj. A. Richmond, of Cumberland, Md. The capital stock is $15,000.

Chas. Brunner of Peru, Ill., will erect a new foundry 70x260 feet.

The Marshall Furnace Co., Marshall, Mich., will extend its foundry.

The Dorner Truck & Foundry Co. is to be incorporated at Logansport, Ind.

Lambert Raskins is remodeling his foundry plant at Ellensburg, Wash.

A. H. Beeher is putting up a foundry at Mason City, Iowa.

The Golden Foundry & Machine Co. of Columbus, Ga., will increase the capacity of its foundry fifty per cent.

The Knapp & Pratt Mfg. Co. of Geneva, O., is adding a brass foundry to its plant.

Carruthers & Co. have commenced operations in their new foundry at Parkersburg, W. Va.

Joseph Ruckman is going to put up a foundry at Nagle, Oklahoma.

The Appleton Screen Plate Co. of Appleton, Wis., has installed a complete brass foundry equipment.

David Nickel has leased the Novelty Iron Works at Morris, Ill., and will continue the operation of same under the name of the Nickel Manufacturing Co. New machinery will be installed.

The Pioneer Iron Foundry of Middlesboro, Ky., which is the property of John F. Grant, has resumed operations after an idleness of two or three years.

The Harris Toy Co. of Toledo, Ohio, will add a foundry to its works.

The Horton Bridge Co. of La Crosse, Wis., has increased its capital stock to $40,000. A new foundry will be erected.

George D. French has purchased an interest in the Gate City Foundry, at Winona, Minn., forming a partnership with L. C. Tarras.

Baker & Shevlin of Saratoga Springs, N. Y., will remove their foundry to a new location, where better shipping facilities will be afforded.

The Canadian General Electric Co. of Toronto, Ont., operating the plant of the Canada Foundry Co., will erect one of the largest foundries in Canada. The first building will be the large general foundry, to be followed by a pipe foundry, for the manufacture of gas and water pipes, hydrants, valves and general waterworks supplies, which the company are now making in the Canada foundry, and the facilities for the manufacture of which will, of course, be greatly increased. Then the company will erect machine shops, structural iron shops, blacksmith shop, pattern shop, power house. Railway tracks will run through each shop, and electric cranes will be provided for handling work up to 50 tons. All the machinery in the shops will be operated by electric motors from current generated in the company's power house.

It has been decided by the management of the International Steam Pump Co. to erect a new iron and brass foundry at Tweedvale, O., a suburb of Cincinnati, for the Laidlaw-Dunn-Gordon branch of the company. The building will be 130x250 feet in size, and have a daily capacity of 25 tons of finished castings.

The large foundry and machine shops of the Carlisle Manufacturing Co., at Carlisle, Pa., which have been idle for ten years, are being fitted up and work will begin about the middle of the month.

Reid & Brown of Toronto, Ont., will build a new foundry.

The Nutting Truck Co. of Faribault, Minn., contemplates the erection of a foundry addition to its plant.

The citizens of Fleetwood, Pa., are agitating the organization of a stock company to operate the Fleetwood Foundry and Machine Works.

Ed. Schulte & Fred Hinken have opened up the old Boekenkamp foundry at Fort Madison, Iowa, and will do a general foundry business.

The Papio Machine Co. is constructing new shops at Lima, N. Y. A foundry building, well under way, is of brick, 74x44 feet in dimensions. The company is also constructing a new grinding room, pattern shop, new blacksmith shop, new engine house and other buildings beside the present machine shop, which is 50x48 feet and equipped with all the modern machinery and hoists. The officers of the company are: E. D. Watkins, president; W. H. Hamlin, vice president; W. J. Coye, secretary and treasurer.

The Ohio Pump and Brass Co., Columbus, Ohio, was incorporated with $50,000 capital, April 10, by T. E. Knauss, R. W. Knauss, T. R. Thrall, John Cummings and T. M. Livesay. The company will do a general foundry, machine, repair and supply business.

A new foundry is to be started at Ladysmith, B. C., by a Victoria firm.

Judson Marsh has purchased the interest of his partner, Horace Jerome, in the foundry at Hillsdale, Mich.

A. C. Godfrey & Co. have leased the Durango (Colo.) Foundry & Machine Works, and will operate on an enlarged scale.

F. E. Brainard and W. J. Underwood have formed a partnership under the name of the Carbondale Machine & Foundry Co. New shops are being built.

The Keystone Foundry Co. has been organized at Uniontown, Pa.

Fracture Indicates Quality.

I show herewith illustrations of two pieces of pig iron, both from the same lot. I have had more or less trouble in the past few years with that class of iron shown in figure 1. It is true that I have been told many times by chemists, iron makers and iron salesmen that when that class of iron is remelted in the cupola, it will make a solid casting. I am not ashamed or afraid to say that they are laboring under a delusion, for I have tried to do this very thing in the majority of ways with hard iron and soft iron, melting it dull and melting it hot, and find that the less the foundryman uses of that kind of iron, the less times he will be called bad names by the men who have to finish the castings. For my part, I find it impossible to get a solid casting with that class of iron. How nice some of the iron makers and the iron salesmen have their lessons taught them. For instance, the foundryman puts up a kick because he does not like the looks of the pig iron. Then he tries to use the iron according to their directions. When he has done so, he has a casting full of shrink holes, dirt, slag and hard iron. Along comes the said pig iron man and says that it is not the pig iron which is at fault, but the molds which have been rammed too hard, or that the sand is too fine, or that the molds are not half vented. Maybe it would be suggested that a gate was too light or too heavy, that the iron was poured too hot or too cold, for "We iron men know what we are talking about, as we work by analysis." All that is left then for the foundryman to work on is wind, for as a general rule, the foundrymen are not lacking in nerve, at least enough to tell the chemist that he does not know it all.

When a chemist or salesman gets through with his little song and dance, what can he say but "Yes." At the same time, we have a think coming for the foundrymen as a class are very careful about exaggerating the truth. With all due respect to the chemist, he is all right, but he does not see or know the style or shape and the kind of work required of one kind of iron, so is it asking too much for us foundrymen to be allowed to have just one little think about the looks of pig iron, what it will do or what it will not do remelted.

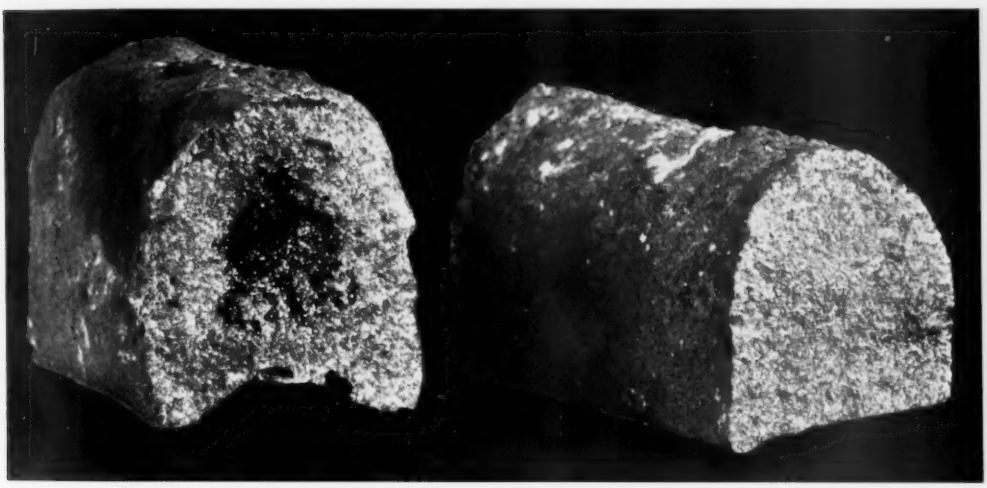


FIG. 1. FIG. 2.

When we tell the agent that we want strong, soft iron, he will say, "We have an iron, such and such a name and number, that is just what you want." We give him the order, the iron is delivered. Perhaps it is all right and we order fifty or a hundred tons more of the same brand and number. It looks nothing like the other lot. We try it and have trouble, and are told by the salesman that he cannot understand it. There is the analysis taken from that cast. It must be some trouble with your coke, or your melter has been careless, or he don't know how to mix the iron, etc., etc.

So we have a talk with another salesman. He has the analysis in his pocket before it is made. We try him and sometimes we get left and others not, but it is from January to January that we are trying to keep out of trouble with our castings, and it will be found

that the foundrymen of this country do not have smooth sailing always. Perhaps it is because we are not chemists, or maybe we lack in experience. If so, we are ready and willing to be taught.

E. A. MAYNE.

All Make Mistakes.

In a recent issue of a well-known mechanical journal, there appeared an article under the head of "Spoiled Work," and the writer of the same acknowledges the fact that he at one time spoiled a job. I presume there are very few, if any men, who have been employed at any kind of skilled labor, who have not at some period of their career botched one or more jobs. If there are any who have not, they are certainly stray children of a very rare race.

I had an experience once as an apprentice which was recalled by the article written. In the shop in which I learned my trade, it was the custom when a circus came to town or any important event occurred, to work overtime and cast in the forenoon, so as to get a half-holiday and full time. Once, the famous balloonist, Johnny Wise, was in town and going to make an ascension, and we were casting in the forenoon to get off in time to see him.

In the southern part of Pennsylvania abound numerous creeks and streams which have dams built across them at various places where are located flour mills, tanneries, etc., the power for which was furnished in those days by the old-fashioned overshot water wheel. This was built on the plan of the paddle wheel on a side wheel steamer, only the water wheel had a large wooden shaft, twelve or fifteen inches in diameter, and was connected with the driving shaft by means of a cast iron crank left into the wooden shaft and secured by heavy wrought iron bands shrunk on the shaft.

On the day in question, it fell to my lot to make one of these cranks, or gudgeons, as we called them. This was about thirty inches high, the neck being about six inches in diameter, the whole being made in a three-part flask. I was one of the last poured off and like other boys was in a great hurry to get out of the shop as soon as I could. I knocked the clamps off the flask and got ready to shake out. With a man at each corner, the cope came off O. K. The cheek was lifted off without any mishap, but in setting it to one side, the lower edge of the cheek caught on the riser and left a casting something like what is shown in figure 1, while it should have been like figure 2. When I saw that casting leaning towards Jones' pig pen, I was in a fit, as the foreman told me to think what I was doing, as the casting was wanted in a hurry, the mill being shut down. I saw the casting bleeding at the point A, and was doing some very rapid thinking. In my desperation, I seized a sledge and carefully pushing the casting back until I thought it was straight, I struck it a blow on top, threw sand around it and left the shop.

My fun was spoiled for that day, however, as all my thoughts wandered to the morrow.

Next day I watched the old helper clean the casting and another cub in the machine shop finish it up. The owner came for it and carried it away some ten or twelve miles in the country. I felt happy and contented at the way I had fixed that casting, but in a few days afterward, I was astonished to see the miller and his wagon in the shopyard.

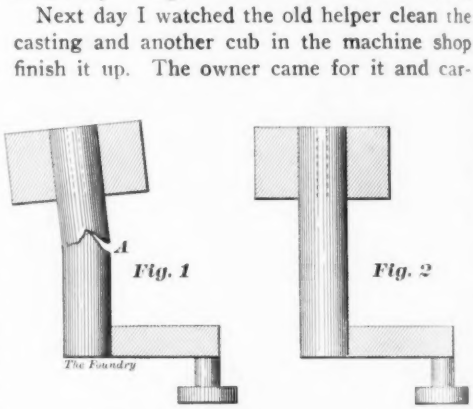


Fig. 1 *Fig. 2*

In a few minutes the proprietor, foundry and machine shop foremen and all hands but me took a hand in holding an inquest, and I too went out to have a look. As I got near to the wagon, I heard the machine shop foreman say that it must have been a "cold shot." I could have told him that it was a "hot" one. What helped me to hide the real reason of this casting being defective was the fact that the miller had had the casting in its place, and in starting up the mill, it broke and in taking it out again, it got wet and rusted so that the real cause could not be seen, the grain of the fracture being very even.

Fifteen years after this incident occurred, in a conversation with my old boss, I called his attention to the real facts of the case and told him how it happened.

F. B. SHAFFER.

Cores for Heaters.

There is quite a number of foremen in foundries making cast iron heaters and light castings who would like to know the best way of molding and making cores for this class of castings. In my estimation, the core is the most essential part, and I would like to know what material will make the best cores.

H. T.

Wire Screen or Woven Wire for Intricate Cores.

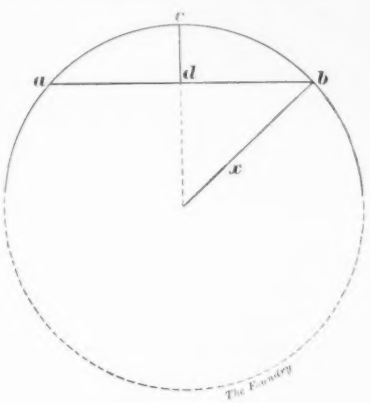
I notice in the last issue of THE FOUNDRY a reference to the venting of intricate cores. A method which I follow is to take some wire screens of woven wire and wrap around a small rod, then tie with fine wire and withdraw rod. This can be bent to fit almost any core and can be rammed in core and left there. It will in many instances act as a rod or stiffener and I should think that something of this nature could be manufactured and sold ready for use. The joint could be fastened or soldered.

I should like to have the opinion of some of your readers why this would not be possible.

F. F. ESCOFFIER.

To Find the Radius of Broken Pulley.

It often happens in a jobbing foundry that there are calls for new pulleys to substitute broken ones, of which only a section is at hand. In order to ascertain the radius of the original pulley I proceed as follows: Lay a straight edge across the broken section from *a* to *b* and let us say this distance measures 30 inches. From the center of *ab* at *d* draw a line perpendicularly which will intersect the circle at *c*, and let the distance from *c* to *d* be 8 inches. Then 30 divided by 2 equals 15 and 15^2 divided by 8 equals 28⅛, to which add 8, which equals the diameter of the pulley or 36⅛ inches, hence the radius *X* equals 36⅛ divided by 2 equals 18 1-16 inches.



WM. JOHNSON.

Deaths.

The well-known Newark, N. J., machinery manufacturer, Ulrich Eberhardt, died at his home in that city March 31, after a lingering illness. He was in his 60th year. Mr. Eberhardt was president of a company incorporated some time ago, which retained the name of the original firm of Gould & Eberhardt, manufacturers of high-class machine tools. The old firm was the first to enter the machine tool business on an extensive scale in Newark.

ULRICH EBERHARDT.

Mr. Eberhardt's entire accord with the shop worker was a conspicuous trait. Indeed he was one of the men in the shop until he was compelled to take to the bed from which he never arose. He took an unusual interest in the men in his employ and started many a young man on a career of usefulness, some to occupy responsible positions in his works, and others to go into foreign fields. His only brother, Henry E. Eberhardt, who still sur-

vives him, was associated with him in the upbuilding of the business, as was also Ezra Gould, who is also living, but no longer identified with the business. Many of Mr. Eberhardt's early associates are now foremen in the shop, having been connected with the works 20 to 25 years.

Through his strong personality, Mr. Eberhardt controlled his shop admirably and he never experienced the unpleasantness of a strike or trouble with his employes. He was a good friend of the Newark Technical School, and in fact all institutions for mechanical training. On December 4, 1841, he was born in the village of Mettlin, Canton of Turgau, Switzerland. His father was humble, but of the ancestry of Count Ulrich Eberhardt. In the early fifties the family crossed the ocean, going directly to Newark. The boy Ulrich was sent to work as an apprentice at the works of Ezra Gould, and his education he received at the evening schools. As a machinist's apprentice he made rapid progress, and before he had reached his 21st year he was in charge of the shop. He was still an apprentice and was then receiving $3.50 per week as wages. Shortly after he had reached his majority, he was taken into the firm, and in 1890 he acquired complete control of the business.

David B. Varney, for many years treasurer of the S. C. Forsaith Machine Company of Manchester, N. H., and formerly mayor of the city, died from typhoid pneumonia March 25, after a brief illness, aged 79 years. He was a native of Tuftonborough, N. H., and early in life entered the employ of the Amoskeag Mfg. Company of Manchester, becoming superintendent of the locomotive department. In 1857 he opened a brass foundry and coppersmithing shop under the firm name of Darling & Varney. Mr. Darling died in 1868 and since that time Mr. Varney had conducted the business alone.

Robert S. Archer, superintendent of the Tredegar Iron Works of Richmond, Va., which was the mainstay of the Confederate Government for the manufacture of heavy ordnance during the Civil War, died in Richmond on March 30. Major Archer was well known in the iron trade of the South.

Henry Perkins, one of the oldest business men of Bridgewater, Mass., died March 24, at his home in that town, at the advanced age of 87 years. He was a member of a family that had long been engaged in the iron manufacturing business in Bridgewater. More than 50 years ago he established an iron foundry, which he conducted successfully for 35 years. He always took an active interest in the affairs of his town and was one of its representative citizens.

Peter Geiser, who established the Geiser Manufacturing Company, one of the largest agricultural manufacturing firms in the country, situated at Waynesboro, Pa., is dead.

George H. Starbuck, who was in the employ of the government as supervising inspector of steam vessels, died in Troy, N. Y., recently, aged 78 years. He was a well-known engineer and before receiving his government appointment, owned and operated a foundry on Starbuck's Island, near Troy. Mr. Starbuck was a graduate of the Rensselaer Polytechnic Institute.

One of the oldest and most prominent and respected figures in the stove trade passed away on Wednesday, March 20, in the person of General John F. Rathbone, president of Rathbone, Sard & Co., the pioneer stove manufacturing firm of Albany, N. Y., and Aurora, Ill. General Rathbone's death, which occurred at his home in Albany, was the result of an attack of the grip, with which he was seized about two weeks ago.

John F. Rathbone was born in Albany on October 9, 1819, and received his early education at the Albany Academy and the Brockport Collegiate Institute. His father died in 1833, and very soon after he removed to Rochester, N. Y., where he began his career in business. Four years later, in 1837, he returned to Albany, with whose interests he was identified ever since. It was then that he entered upon the line of business which he followed throughout his life. He became a clerk in the foundry of Joel Rathbone. During three years' service in that capacity he not only performed his regular duties, but also perfected himself in the practical details of the business. He had a "floor" prepared for his own use and learned the business of molder by actual practice of the art. So with other details, until he was fully equipped with the special knowledge which later proved of great value in the business which he organized for himself. After a business connection of five years with the late S. H. Ransom, in 1845 he built a stove foundry, which subsequently became one of the largest in the world. In later years he associated with himself Grange Sard and others in the firm known as Rathbone, Sard & Co. Some years ago General Rathbone left the most active supervision of this firm to his

juniors, although he remained the president of the concern.

The death occurred on March 13 of Mr. Thomas Parkin Moorwood, head of the firm of Moorwood, Sons & Co. (Lim.), of Harleston Iron Works, Sheffield, England, aged 65 years. For about forty years the deceased was engaged in the steel trade, and his death removes a prominent figure from Sheffield industrial circles. He was born in 1835 at Ecclesfield, and his early business career was spent at the Thorncliffe Iron Works of Newton, Chambers & Co. About 1860 he went to Sheffield, and, in partnership with his brother-in-law, Mr. Thomas Watson, and the late Mr. Thomas Marshall, established the Harleston Works, Carlisle Street, East. The business carried by the firm was that of engineers and ironfounders. One of the chief branches of the work has always been that of producing castings for use in the Sheffield trades, and the Harleston works have developed with those trades until now the foundry, in its capacity for turning out large castings, is one of the most important in the North of England. Between 400 and 500 men are employed. Both Mr. Marshall and Mr. Watson ceased their connection with the firm, and for the last ten years the business has been entirely under the management of Mr. Moorwood, two of his sons being the chief members of the firm besides himself.

John C. Porter, president of the Porter Foundry & Machine Co., Allegheny, Pa., died April 10, aged 66.

August Zinth, who at one time conducted a foundry at Ripon, Wis., died at that place recently, aged 60.

Making Steel.

"The most efficient steel mill in the world is that at Ensley, Ala. There are larger ones in the North, but none which uses such remarkably modern methods in all the processes of production. Every step is automatic: from the time a miner picks up a piece of *coal* in the mines and places it in his barrow, it is not touched by *human hands* until it is ready to be packed and shipped as *finished product*. Meantime it has undergone all the various operations of the furnace and mill."—World's Work, March, 1901.

How the New South is oustripping us! Here in the North the coal to be converted into steel is picked up by the miner, placed in his barrow and wheeled by him out of the mine to the mill, where it is broken up with a sledge. It used to be broken up by human hands, but even in the North this stage has been passed now. The miner hands it over to the melter at this point and the latter carefully packs the pieces of broken coal in a tin pan on the stove, where it is boiled for several hours, a blast of air being continuously blown onto it by the melter. In the more modern plants he uses a bellows, but in the old ones he blows through a long iron tube while stirring the coal with the other hand. Some of the melters thus acquire great proficiency in this line, and it is said that the blowing of some of those of this city is well-nigh phenomenal and cannot be surpassed on this side of Chicago.

When the gases given off have a certain color the melter adds a small amount of a composition of limestone, salt, etc., to physic off the carbon disulphide, hydrogen sulphide, and other injurious ingredients. This converts the raw material into semi-steel, in which state it is taken from the stove and passed over to the molder, who kneads it carefully on a molding board to work out all of the organic matter. It is then washed with cast-steel soap, which is the final step that converts it into steel. It is then ready to be worked up by pounding and squeezing into the finished product, such as marine engines, carpet tacks, etc.

To make the different qualities of steel this product is sometimes melted up with the addition of other metals, and poured into holes made in the sand floor of the shop; these puddles of metal harden as they become cool, and the product is known as puddled steel. When it has been heated too much, however, small hollow projections appear on its surface, and blister steel is the result. If the sand of the floor is too "fat," as they call it, "pig iron" results, which contains a good deal of steel, but can be used for nothing but agricultural implements.

It is very pleasing to hear that all these laborious hand processes have been discarded at Ensley.

MOLDIMAN HOOFET.

A Few of the Reasons Why Malleable Foundry Foremen are Scarce.

Literature of practical value in this business is rare, and those who do understand malleable iron are not always writers, while the

few who write on the subject neglect as a rule to mention anything that would be of value to an ambitious molder, and he certainly is the only one fit to be foreman in a malleable shop.

Presuming that he started right, by working in the core room of a malleable shop, and that is where his training should begin, there being no secrecy attached to this part of the business. He soon learns to make cores as they must be made in a malleable shop; he then starts to work in the foundry. If the foreman is up to date, he will get a job that has a long order on it, one that the former knows is not likely to have many lost castings. When that is finished, he is likely to get something just a little more difficult until he finally becomes a molder. He, of course is working on piece work so that he has very little time to study up shrinkage and crystallization as connected with malleable iron. He sees castings misrun, cold chilled, shrunk and cracked, but who is there to tell him why? The foreman as a rule thinks life too short to stop and explain, even if he knows.

Now, if he tries to find out the reasons for these things and is not very careful about it, he may never learn how to cure the trouble with his job, as it will not be discussed on his floor.

We will suppose, however, that he has an ear tuned up to catch a whisper, sharp eyes and a good memory, some executive ability and is now above all else a first-class malleable molder. If he is one of the fortunate, he becomes foreman of the foundry and right now he finds out how little he knows, especially if he wants to get to the front in the business. Having been tied to his floor for perhaps seven or eight years, he is not likely to know anything about how to lay out or build an air furnace—much less how one should be run. As to mixtures of iron to produce good malleable and when it is right, these are things that if he learns, he must keep his hands out of his pockets.

Perhaps he will make short visits to the annealing room and if that department happens to be in charge of some one who thinks that there is need of but one annealer in this world, he will find it a very hard matter to learn just how to design or build an annealing oven. Leaving out the question of packing, how it should be treated, how the different jobs should be packed and finally how an annealing oven should be run to produce the best results.

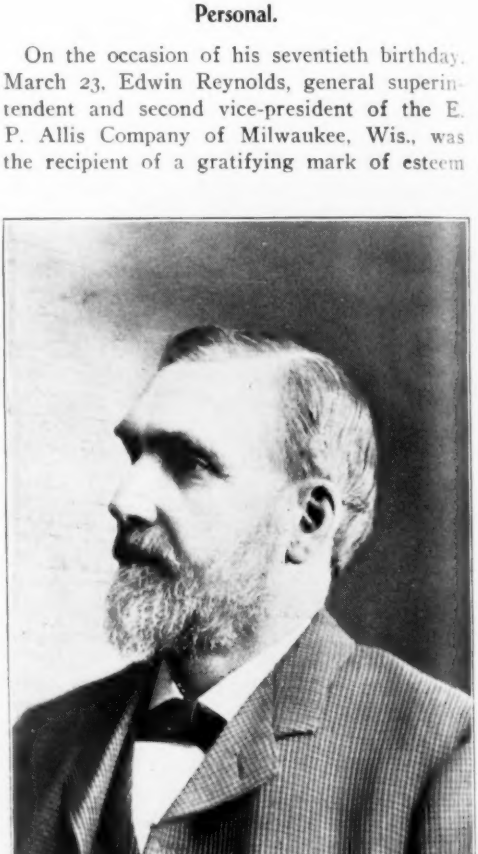
He should learn all these things as well as attend to his duties as foreman in the foundry. For, if he slights his business in the molding room, he will be a failure as a malleable foundry foreman.

WM. H. KING.

Syracuse, N. Y.

Personal.

On the occasion of his seventieth birthday, March 23, Edwin Reynolds, general superintendent and second vice-president of the E. P. Allis Company of Milwaukee, Wis., was the recipient of a gratifying mark of esteem



EDWIN REYNOLDS.

from the company's employes in the shape of a magnificent desk and set of mahogany office furniture. The desk, which is valued at $1,500, took a first prize at the World's Fair in Chicago, and also at the Antwerp Exposition.

C. J. Houck has resigned his position as superintendent of the Duluth Foundry and Machine company and accepted one as general superintendent of the Stockham Manufacturing Co., Chicago.

J. Benton Orbison has become superintendent of the iron, steel and brass foundries of the Joliet (Ill.) plant of the Federal Steel Co.

Sim Guest, for a long time foreman of the foundry of the Canton Foundry & Machine Co., Canton, Ohio, is now traveling in the interest of a well-known molding sand. Patrick Doyle succeeds Mr. Guest.

Fires.

The Belle City Mall Iron Co., Racine, Wis., suffered a considerable loss in a recent fire which originated in the core room. Only the warehouse and pattern shop were affected, however, and the plant is running with a full quota of men.

The Mountain City Stove & Mfg. Co. of Chattanooga, Tenn., had its foundry department destroyed. Loss about $6,000.

The Detroit plant of the American Radiator Co., located outside of Detroit (Mich.) city limits, was almost completely destroyed by fire April 6, the pattern shop, machine shop and warehouse being reduced to ruins. The loss is put at $150,000, insured.

The foundry and pattern shop of the Cooke Locomotive Works, Paterson, N. J., were destroyed by fire April 8.

A fire at the plant of the A. A. Griffing Iron Co., at Jersey City, N. J., damaged it to the extent of $75,000.

The foundry of the Wenzel-Mann Mfg. Co. at Streator, Ill., was badly damaged April 6, a number of patterns being destroyed. A spark of metal lodging in a barrel of charcoal is the supposed cause.

Fire damaged the plant of the Kurtz Foundry Co., Chicago, Ill., to the extent of $25,000 recently.

The plant of the Kerr-Murray Mfg. Co., Ft. Wayne, Ind., with the exception of the foundry, burned March 22. The loss on patterns and machinery is heavy.

Molding Pulleys with Green Sand Arm Cores.

Having seen numerous articles on molding pulleys and fly wheels I have noticed that none of these approaches a method that has been in practice for some time, the principle of which is practically the same as related in "one" of the "two ways of doing the same job" by Henry O'Neil in the November issue, only that in this method green sand core arms are used in both pulleys and fly wheels ranging in diameter from three to ten feet. In the foundry where this practice is in vogue the specialty is pulleys. They have cast iron ring patterns in sizes ranging from 6 inches to 84 inches, and all pulleys made in the floor, deep or shallow, single or double arms, are made with green sand cores, the molder making these, and all things considered, this way of molding is quicker than when dry sand core arms are used. I have seen a molder work six hours on a pulley 5 feet in diameter—15 inch face, and I have seen the same man make a casting of the same dimensions with green sand cores in four hours.

After having a hole dug out and ring set, nearly all are of uniform depth, the patternmaker would cut a bed strike to be worked around on inside (after sand had been rammed to required height), thus forming a core bed, the center or seat core, being centered and bedded in. In almost every case the outside was rammed up with a segment, after the inside had been finished, and these molds were mostly always cast open. Frequently sizes were called for that made it necessary to put spindle in socket to sweep the bed, and afterward to be used for segment guides. Fig. 1 shows the core complete ready to be set on bed.

Fig. 2 shows the box before being put together; the dotted lines indicate where wedge

Fig. 1

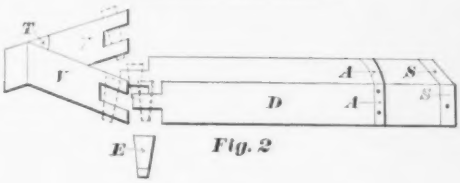


Fig. 2

Fig. 3

Fig. 4

E is inserted to hold box together when arm, Fig. 4, is located. SS is a false end with one screw inserted from each side, just to hold sides together while it is apart from hub end VV; AA is the end of box proper, and is fastened to one side permanently with two screws, the other side with two pins, to permit of spreading box to clear the core. C, Fig. 4, is fillet end of arm pattern and is screwed on to AA, and has pins to support arm at that end of box, during process of ramming, the hub

supporting the other end. AA can be adjusted backward or forward to conform to any desired size of wheel, hub blocks T also. The bed being ready a temporary bench is constructed of two ordinary trestles and a two-inch board is placed thereon. A plate, that fits inside the box and gives half an inch clearance on each side, and about three-quarters on each end, is laid lengthwise on the bench, and box placed over it, for be it remembered that the core box is open on top and bottom, and after dividing space between box and plate as near as possible, the molder proceeds to ram it up good and hard, being careful to put facing against both ends, and around the arm pattern which of course is in center of box; after ramming hard on sides to a little above the top of arm, fill box up with loose sand and strike off, dip the ends of another plate in clay wash, lay on top of sand dividing as on bottom, rap plate down about three-quarters inch below joint (top) of box, then make both ends up, and sleek off even with top of box, particularly hub end, rap box some and twist it crosswise on bench, being careful to balance it there, knock wedges E out, tap end VV, and draw it off, then spread side D just a little, and draw that off the other way; this is necessary because C, Fig. 4, the fillet end of arm is attached to AA, back end of box; then the helper taps the arm from small end and the molder draws it out at hub end. Two small carrying sticks are used to lift the core from the bench, and carry it to the bed.

After all the cores have been placed, if a ring pattern is used, ram up between the arms to say five inches above them, and then they can be walked on, sat on or laid on without any fear of breaking them down. Place ring core on hub to raise it to the required height, tuck around, and finally walk it off, then the molder has a nicely finished hub, differing from one made with dry sand cores, which nearly always require filing and scraping. The hub finished, and covered with a covering core, a bed of sand is thrown on, walked off solid, and struck off as near level as the eye can get it when a plate large enough to nearly cover the inside of the mold is lowered and rubbed on, and ring pattern drawn. Then the inside of the mold is gone over carefully, plumbago applied, and the outside rammed up with a segment, runner built, mold weighted down and cast.

These arm boxes are made in two sizes, 6 inches wide and 6 inches deep for light arms, and 8 inches for heavy arms. Fig. 3 shows box and arm put together. For split pulleys, split lugs are rammed up in two arms, then reversed and two more rammed up, and for the remaining ones the lug is of course left out. When the arms are properly rammed, hub nicely finished, as well as the inside of rim, there are no joints or fins to be seen on the entire casting, consequently no chipping has to be done except on gates and riser.

The plates in arms must necessarily be quite heavy, the bottom one at least, when arms are very long, else they would spring when lifted. These arm cores are never wired, clamped or bolted together, the fact of the matter is they couldn't be, yet nothing ever happened them from that cause. True, none of these castings are very heavy, never over 5,000 lbs., yet some of them are quite deep, and with double arms.

When sheaves of 6, 8, 10 or 12 grooves are ordered, the inside is made the same as a pulley with the green sand arms, with bed struck off outside for dry sand groove cores, the ring drawn off, finished, double wedge thickness pieces placed all around inside circle, groove cores placed against them and on the bed, sand filled in and rammed to the top, thickness pieces drawn out, covering cores located, weighted down and cast. Fly wheel beds are usually swept from spindle, green sand arms, located and divided, hub finished and covered, rim segment placed, and this is always made long enough to reach from one arm to the other, inside and outside of mold being both rammed up together and finished in usual way.

RICHARD BARNETT.

From Across the Atlantic.

The great variety of articles appearing in THE FOUNDRY is remarkable for a journal devoted to a particular branch of manufacture. I have been reading over Mr. Sand's criticism of a paper written by the late Eli H. Pearce in favor of wooden flasks. (February *Foundry*.) Although my sympathies are naturally with our own methods, I would not say that wooden flasks were a humbug. The reason we have a very poor opinion of wooden flasks in Great Britain is because whenever their use is resorted to, it is purely a makeshift and they are made from any scrap stuff which may be lying around and not gotten up in a way to last any length of time. I therefore think that Mr. Sands should have considered what might be done with properly constructed wooden flasks before he criticised them in the way he did.

For myself, I would like to see a typical American flask illustrated with drawings, showing pin arrangements, etc., as I only have an idea as to what they look like. How are they strengthened at the corners and do they require bolts at the sides to take up pressure?

It is my opinion that a mold should be poured as hot as you dare do it, that is to say, in a heavy casting, the large body of iron would, under usual conditions, burn the facing off the mold and cause anything but a smooth casting. If scabs are on the casting, blame the venting and not the hot iron. A better casting and a sounder one can be gotten from hot iron than from iron which has been cooled down.

The general idea here (I do not know whether we got it from the Yankees or not) is that to save a casting from "drawing" it should be cast as cold as possible. A great many jobbing foundries especially do this, but it is a great fallacy. It is the molding, gating, pouring and the speed with which the latter is accomplished which are the controlling agents. Many a casting cast carelessly "draws" and the same casting made by a molder who knows his business and knows just what size of a stream to let fall from his ladle will cast it all right.

GEORGE G. URE.

Shettleston, England.

The Coremaker's Trade.

Though coremaking is becoming more of a science every day and a very important branch of good foundry practice, the coremaker himself is treated with but scant courtesy, as one having no rights which anybody around a foundry needs to respect. Indeed as a rule because a coremaker's product is not salable in itself, however useful it may be, the coremaker is looked upon as being a dead expense to the management and his services are charged up on the profit and loss page of the ledger.

It is true perhaps in a measure that in bidding for work a firm will attempt to estimate the core work on a job, but some of them greatly miss their calculations, because no intelligent rules are applied to the management of the core department.

The wages of a coremaker may be but a little above that of a common laborer upwards to $3 per day. The way a manufacturer looks at it is that so many men cost so much per day and that but little outfit and material is needed to work with. The coremaker is in many places asked to use floor sweepings, old cores, burnt core sand wet down with a little water or sometimes a bit of cheap molasses, just as little as possible in order to save expenses. The core oven is usually good, that must be admitted. Core plates are generally furnished, but instead of making a lot of small plates suitable for different sizes of cores, they are all made the same size to save the molder's time. The cores can be dumped on them and slid up. If they won't slide, dump them as close as possible and let them lay. If there are no plates, put cores on bottom boards and burn them up. Rods, wire and nails to secure the cores with are generally hard to get and scarce as ready money.

In other branches of the foundry trade, the men are furnished help to do the unskilled work and given the necessary tools and material in order to keep them at their task and increase their output, but with the coremaker it is different, the peculiar impression prevailing that no matter how well he may be supplied with everything necessary to make good cores, both in quality and quantity, he would only do so much anyway. The firm will kick on the cost of the cores, but it is seldom they will see the real cause of it. In a lot of shops the coremaker has to do two or three hours' work every morning knocking rods out of castings, mixing sand and other routine work that could be done just as well by the common laborer. Yet it is seldom a coremaker does enough to suit his employer and the molders are more or less waiting for cores.

Of course there are quite a few foundries that do run on an up-to-date system and in which the coremaker is shown the same consideration as the journeyman in other branches, but generally speaking quite the reverse is true. It has been asserted that although the art of iron founding is an old one, still improvements have come so fast within the last ten or twenty years that wonderful strides have been made and the real value of the coremaker as a specialist has come with that period. Prior to this time, it did not occur to the foundrymen that there was money in making their castings lighter by coring them out as much as possible. True, cores have been used at all stages of the foundry business, but never to such an extent as now. Many will undoubtedly recall the difference in appearance between a casting made twenty years ago and the one turned out today. That it is lighter, more elegant, and more serviceable is due to

the core work. The coremaker is the product of an evolution in the foundry business. He has come to stay. There was a time when a molder considered coremaking part of his trade, and there are a few of them who still cling to that idea, but they must be classed among the "old timers." Coremaking is a science which requires as much skill as any other trade, surely as much as molding, and why coremakers are not furnished with the same conveniences and paid the same rate of wages as the molders collectively speaking is one of the problems we are trying to solve. It is acknowledged that a certain amount of core work is plain and requires little or no skill and the foundryman who is always looking for cheap labor urges this as a reason for putting on boys and girls, but then there are very few trades or even professions in which boys and girls could not do a certain amount of work quite as good as the well-paid mechanic.

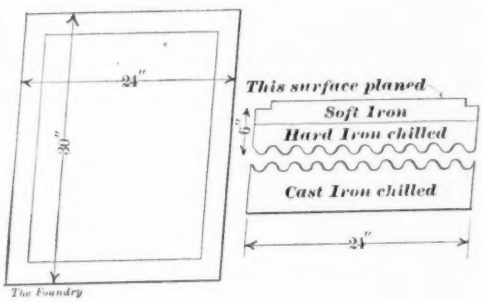
Another thing which militates against the coremaker and certainly is an injustice to him is this: A number of different kinds of molders may come to work in a foundry. One may be good at only heavy work, another on loam, another on light work, and still another who is worth nothing except on the bench. No distinction is made in the case of the coremaker. He must be one in every sense of the word. A molder may lose a piece of work again and again and nothing very much is said about it; but if the loss can be traced to the coremaker, there is trouble. There must be but one class of mechanics with us it seems.

If a little of the consideration which is shown molders was bestowed on the coremaker, he would intensify his labor and make himself more valuable to his employer. This reference to the molder should not be construed as an attempt to "chop" him. Such is not the purpose of this article, but simply to state the case as it is, and the molders' trade has been selected as the one most familiar to the readers.

L. F. BANGERTER.

Chilled Castings.

Which is the most successful way to cast chilled faced castings with soft gray iron backs, such as the corrugated dies for rock crushers shown in the illustration? These must be very hard on the face and soft enough on the back to plane up easy in the machine shop; they should also be clean and solid castings.



What kind of irons will make the hardest chilled face, that is one which will stand the greatest wear?

FOREMAN.

Bench Molding.

I am surprised at times that I see very few articles about bench molding in a journal like THE FOUNDRY. Is this absence due to the fact that molders or foremen of light work foundries believe that they are of little use or take no important part in the foundry business of this country, or is it because they know more about cupola and foundry practice than they do about writing an article for the gaze of the public?

It is my opinion that when people get the idea into their heads that anyone can run a foundry making small castings, they make a serious mistake. At present, I have charge of a foundry in New England employing seventy-five molders making castings which weigh from one ounce to 500 pounds. We have about five floor molders on light floor work, five more on tables and the remainder on bench work. Most of this is gated. I have my doubts whether some heavy weight molders who are capable of making twenty-five ton castings would not have to scratch their heads before they could make some of the fine crooked work we handle daily. The majority of our castings must take a very high finish, as they include ornaments, plaques, piano lamps, mirrors, electrical castings and a thousand and one other articles in these and other classes. To produce such work for the sum of three, four or five cents a pound, one must keep his eyes open. The iron must be very soft, very hot, clean, strong and have but little shrinkage. By the way, we do not melt fifteen to one here, but about six and one-half

to one, and I think we are doing as well as the majority if not better than most of them.

I have made it my business for the past few years to visit other foundries doing bench and heavy work and I find that what I have read as being done in these shops is sometimes greatly exaggerated, and I also find that a great many improvements can be made especially in and around a cupola. The saving of a few pounds of coke and the cheap thickheaded cupola man is a costly combination. If I want clean castings, I look for a clean mold, whether it be for light or heavy work. I never get it unless I melt the iron hot. Of course I am not obliged to pour it hot except in light work, but if the iron is melted hot and run into a ladle it is given a chance to separate itself from the dirt which it contains. If, however, it comes out of the cupola very dull, the dirt is in the iron and must go into the mold, where you will hear from it sooner or later.

Most of the light work foundries have more or less trouble with hard and dull irons. I claim that a man does not know his business if he has dull iron regularly and he ought not to be troubled much with hard iron if he has a head of his own and does not pay too much attention to what the pig iron agents have to tell him. Half the time, these gentlemen do not know what their irons will do when mixed with home scrap and other irons, any more than I know who will receive the next touch from Carrie Nation's axe. The chemist is all right at the furnace where the iron is mixed and made, but I find that they very seldom get two runs alike at the same furnace or else the atmosphere must change the iron while it is on its way to New England for we get all kinds and if we put in a kick, the agent will take an oath on a stack of Bibles that his iron is all right for the analyses are taken every day.(?) Last summer I visited three furnaces, but during the time I was there, they seemed to forget all about the analyses at each of them. I suppose it may have been one of their busy days and will have to excuse them. The majority of our foundries not being able to employ a chemist have to take the seller's word for the analysis of the iron. Sometimes he is right, sometimes he is wrong, so we take what is left—that is, a look and a guess and some of us are pretty good guessers too and that is the reason we have so little trouble from hard iron.

I believe in high silicon irons as a medium for bringing about the right mixture in the cupola when we have to run off half back stock and scrap and must have a very soft iron.

We have more or less trouble with coke, but they all tell us they make the best so I guess they do—not. What we all want, we don't get, but in some foundries in this part of the country, they do produce a good, clean, fine close-grained, soft iron casting with cheap irons.

NEW ENGLAND.

The Foundry Office.

The clerical side of foundry work is not so important, and therefore receives much less attention than does the practical or scientific side. But nevertheless it is an essential part of a modern foundry, for nowadays, with keen competition to face, it behooves us to give, not an eye, but "eyes," to the most minute detail, and this can only be done in those establishments which keep records of such detail.

The following lines are not written with any intention of giving definite rules, but rather to act as suggestions—and of the data given none of it is taken from actual practice. The reason for this is obvious, and indeed the whole thing is intended to be suggestive rather than definite.

The office of a fair-sized foundry should be worked as methodically as the foundry itself is supposed to be. It should be fitted with all conveniences for foreman and clerks alike. with regard to the number of the latter—for a foundry employing 150 molders, two would find full work in keeping the books and costs up to date. Their duties we will go into at some future time, but they would roughly include molders' and laborers' time, labor and furnace costs, and the finding of general and material costs per ton of trimmed castings, every ton of casting should be accounted for in this manner. The books would include foundry order and castings despatch, stock, day, and the general books required in office routine. All time, day, piece or premium, is made up here, and all correspondence concerning the foundry is done in the office. Materials, tools, stock, etc., are entered as required and ordered either direct from the makers or through the general order office of a firm.

A foundry of the size indicated would have stores and a storekeeper in charge. No material would be given out without an order from the foreman or his deputy. If the value of this plan is doubted, let my readers cast their thoughts over some of the foundries they are familiar with. What about the nail kegs left open in odd corners of the shop—do all the nails find a legitimate and economical use

in the foundry? The blackening barrel is another good illustration. Do all the contents of this barrel find their way into the shake bags or pails, or is not a quarter of it wasted over the floor? The economy of a store and storekeeper in a large foundry is evident. The real question is now to make the best use of them. The storekeeper has an inwards and outwards book, which in turn goes into the office each day for entering up. By this plan the present stock of any article can be readily ascertained, and the foreman knows exactly the position of his stock and his probable requirements. The storekeeper also holds a record of special tools, as slings, screw or hook bolts temporarily given out. These are entered up against the man's name and number, and whilst in his care he is held responsible for them. All foremen will recognize the advantage of this plan and to a few it will recall many a weary half hour spent in search for special tackle which might by a system of this kind have been saved. Indeed, there is no reason why the stores of a foundry should not be utilized as much as the tool room of a machine shop.

In summing up the cost of castings, the foundry clerk should adopt a system that will give his foreman definite information to work on. The tabulated cost sheet should be precise and concise, in order that the foreman may readily put his finger on any part of his foundry in which costs are beginning to creep up. In this respect a good method is to split the labor up into units, as follows:

Molders, helpers, trimmers, crane drivers, slinging and casting gang, furnacemen, yard gang, foundry foreman and clerks. This will give the labor costs, and from it the labor cost per ton can be arrived at.

The costs of materials can be split into units in a similar manner: Metal, coke, fluxes—including special elements, as aluminum, ferro silicon, carborundum, ferro sodium, fluor spar, etc. Materials: Sands, facings, molders' tools, etc., furnacemen's tools, trimmers' tools, laborers' tools.

The four latter items are determined from the foundry's previous experience, and the figures once fixed are used as constants. In a similar way constants are drawn up for wear and tear of plant, building, etc.:

Buildings, Cranes, Furnaces, Plant.	Depreciation	Boxes and tackle, green sand.
		Boxes and tackle, dry sand.
		Plates, building rings, etc. for loam.

In iron or steel founding these items are worked out into figures per ton or trimmed castings—that is, per ton of actual output. The sheets are tabulated weekly, and afterwards struck out into monthly and yearly averages. An analysis of costs performed after this plan gives exact information to work on.

Without a subdivision of this kind costs may go mounting up until they reach a high figure before detecting the real cause. A profitable basis of work is thus arrived at, and standards or constants for each unit in different classes of work can be set up.

But a constant or level profit cannot be maintained with fluctuating work. For instance, the average capacity of the foundry may be maintained in all branches for some time; then the class of castings will change and loam work may predominate, necessitating fresh arrangement of shops, new men, etc., which help to swell the costs. At another time dry sand or green sand may predominate, with the same result. The remedy for this evil lies in specialization, but in many large foundries extensive specialization is hardly possible.

This system of book and cost keeping, if earnestly followed out, will give data as to these fluctuations of work, which can be used, as far as it is possible, to anticipate these changes and to a certain extent minimize the losses they cause. In any case, "forewarned is forearmed," and the concise record of two or three years of back work is often a good index of the future.

No mention has yet been made of the orders to the foundry. These, in all engineering or jobbing foundries, should emanate from the pattern-making department.

Patterns coming into the foundry should have on them a label—gummed or otherwise—containing particulars of orders, number of castings required, reference number, etc. In addition to this label an order—of which a duplicate is kept in the pattern shop—is delivered into the foundry office. Each day's orders are entered up by the clerk in the foundry order book and in here are noted grades of metal or any particular feature required in the casting. A column on each page of this book is reserved for dates of delivery.

The trimmed castings are despatched to the department requiring them, by a trimmer trained for the purpose, and who might be known as despatch clerk. With each order he fills up a receive note—of which duplicates are kept; on it are noted reference numbers, quantity, weight, etc. The duplicate sheets are entered up daily, completed orders marked off, and weight of all castings obtained.

A record is kept of all defective castings, whether lost in the foundry proper or spoilt in machining. The record is extremely useful. By means of it bad work is traced to its right source, and hence the foundry escapes much of what, in cases where no actual records are kept, is put down to bad castings.

PERCY LONGMUIR.

Notes from Various Sources.

The Perry Coal Co., miners and shippers of Youghiogheny coal have sold their property to the Washington Coal & Coke Co. This will increase the latter company's output to 5,000 tons daily.

"A Few Facts of Value to Foundrymen" is a pocket sized pamphlet issued by Frank L. Crobaugh of the Foundrymen's Laboratory, Cleveland, Ohio. In chapters on "Scrap," "Coke," "Figuring Mixtures," and "General Remarks," the author takes up some of the latter day methods of obtaining castings of a known quality. Those interested in controlling their mixtures through chemical analysis will find much of interest in this little volume.

T. B. Wood's Sons, manufacturers of power transmitting machinery, Chambersburg, Pa., are mailing to the trade their catalogue No. 12.

The United Telepherage Co., 20 Broad St., New York, has issued circulars Nos. 11 and 12, illustrating some examples of the telepherage system for conveying materials of various kinds.

One of the neatest booklets which has come to us for some time is "Silicon in the Brass Foundry," issued by the Cowles Electric Smelting & Aluminum Co. of Lockport, N. Y. Its title indicates its contents and a copy may be obtained by addressing the publishers.

The Kingsford Foundry & Machine Works of Oswego, N. Y., are sending out a neat catalogue describing their centrifugal pumping machinery.

The Chicago Pneumatic Tool Co. has issued another of its highly illustrated and attractive catalogues showing the tools it manufactures in use for a great variety of purposes.

The new edition of the catalogue and price list of the Diamond Machine Co., Providence, R. I., is a handsome specimen of workmanship in this line. It is a book 6x9 inches, containing 124 pages and profusely illustrated throughout. In it are briefly described and shown this company's fine line of grinding and polishing machinery, lever and screw feed lathes, special machines, polishers' supplies, etc.

S. R. Church, of San Francisco, Cal., whose novel ideas in advertising are well known to our readers, has favored us with the first part of his base ball calendar. Copies may be obtained from Mr. Church for 30 cents.

The Philadelphia Pneumatic Tool Co., of Philadelphia, has been compelled to increase its factory and to that end its offices have been removed to larger quarters at 1038 Ridge ave.

The Smooth-On Mfg. Co. of Jersey City, N. J., is sending out a booklet dealing with their preparations for making permanent repairs in leaky castings, radiators, boilers, etc.

Catalogue No. 116 of the B. F. Sturtevant Co. is being mailed to those who request a copy. It describes disc and propeller fans.

H. S. Vrooman, Chicago, manufacturer of fire brick, who was formerly located at 220 W. 20th street, has moved his office to the corner of W. 18th Place and Sangamon street.

Among the United States patents recently issued we notice one to the Osborn Mfg. Co., Cleveland, which is of special interest to foundrymen. This patent covers a rubber rammer which is attached to the handle of a molder's shovel. Sample lots have been tested by a large number of foundries from whom very gratifying reports are received.

The fire which visited the works of the B. F. Sturtevant Co., at Jamaica Plain, Mass., on April the 14th, proved to be far less disastrous than at first reported. Only the engine and electrical departments were injured. The power plant was started up with but a single day's delay incident to renewing belts damaged by fire, and the entire Blower, Heater, Forge, Galvanized Iron and Shipping departments with the Foundry, Pattern shop, etc., were in full operation on that day and the shipments going forward as usual. No valuable office records were lost, the most serious damage occurring in the Advertising Department, where a large amount of printed matter was destroyed. Fortunately, however, an entirely new general catalogue was in press at the time and copies were issued on the 16th in the time to meet all demands for information. New offices were established on Monday morning in a nearby building, and at noon the business was running as usual. With these facilities at its disposal, there is no likelihood of any delay in shipments except such as may occur in the Electrical and Engine departments, and arrangements are already made for handling this work.

Castings of High-Tension Bronze.

The demand for castings of high-tension bronze necessitated by the general use of high steam pressures has led to the production of a number of alloys, all giving excellent results in the testing machine. It has, however, been discovered that much greater care has to be taken in the foundry than is necessary with ordinary gun metal or brass work, since most of the alloys in question contain an unusually high percentage of zinc, and mixtures of this character are very sensitive to the slightest oxidation in the melting process. The French Admiralty specifications demand that castings of these high-tension bronzes should show an elastic limit of 27,000 lb. per square inch (16 kilos. per square millimetre), an ultimate strength of 49,700 lb. per square inch (35 kilos. per square millimetre), an elongation of 18 per cent in 4 in. The standard specimens are of circular section, being 0.543 in. in diameter, and they are cut from actual castings, and are not merely specimen bars. Specimens showing a less tensile strength than 35 kilos. per square millimetre are accepted, provided that this departure from the standard is compensated for by increased ductility, though no specimen is regarded as satisfactory in which the strength falls below 42,600 lb. per square inch, or in which the elongation is less than 15 per cent in 4 in. If over one-quarter of the sample bars fail to pass the prescribed tests, the batch of castings is rejected. In addition to the above, the authorities also require that the absence of porosity in castings intended for steam fittings shall be proved by hydraulic pressure, which in different cases may amount to from 142 to 711 lb. per square inch. More recently drop tests have also been specified. The alloys used include Delta, Parsons, and Stone bronzes, as well as some mixture of Continental origin. Certain mixtures used at the foundries of the Forges et Chantiers de la Mediterranee are described by Gauger in the "Bulletin Technologique," together with some particulars as to the shop practice. The ferro-manganese bronze used is as follows: Red copper, 65 parts; zinc, 33 parts; ferro-manganese containing 50 per cent Fe., 7 parts.

A ferro-aluminum alloy, also employed, contains 58 parts of electrolytic copper, 42 parts of zinc, 1 part of lead, and 4 parts of ferro-aluminum (containing 50 per cent of iron). A third alloy, containing both ferro-manganese and ferro-aluminum, is also in favor. Its composition is: Red copper, 60 parts; zinc, 40 parts; ferro-manganese (with 50 per cent of iron), 1.5 parts; ferro-aluminum (with 50 per cent of iron), 4 parts. All these alloys shrink considerably, and larger gates and runners are necessary. The molds are either swept up in loam, or, if complete patterns are used, may be in sand. The latter gives better finished castings, but the former is cheaper, especially for heavy pieces. The latter, when molded in sand, require an addition of sawdust or a like material to the sand to ensure that the walls of the mold shall be sufficiently porous to give a free escape to the gases. Small molds are best dried in an oven, but this must always be started slowly, though once the outer surfaces are hard the temperature can be raised. With heavy castings the drying must, of course, be effected in situ with coke fires. When quite dry, the molds are faced with plumbago, and is is best to allow a period of twelve hours to elapse between the final drying and the making of the cast. The heavy portions of a casting should be placed at the top of a mold.

For light castings large runners are required to ensure that the mold shall be properly filled The metal is melted in a reverberatory furnace for heavy work, or in crucibles for lighter castings. In the former case, care is necessary to expose to oxidation as small an area of the molten metal as possible. The ingots are slowly raised to the temperature of melting, but this once reached the fire is forced so as to fuse the whole nearly simultaneously. When the metal is thoroughly liquified, sample castings are made in chills. These are then broken, and the quality of the metal judged from the fracture. Fresh zinc is added if thought necessary, and further samples are taken, and the composition adjusted till the desired character of fracture is attained. The alloy is then ready for casting.—["Kuhlow's."

The Discovery of Iron.

Teacher—Sammy, can you tell me where and how iron was first discovered?

Sammy—I can't tell you just where, sir, but I think I know how it was discovered.

Teacher—Well, Sammy, what is your information on that point?

Sammy—I heard pa say the other day that they smelt it.—[Western Paper.

Good Education.

"But, after all, don't you think a good education is an essential in business success?"

"Not much," replied the wealthy man. "It was my poor education that gave me a start. I done a job o' work for a rich fellow, and made out my bill for 'too dollars.' Besides the bad spellin' I forgot to cross the t. He sent me a check for $100."